United States Department of the Interior
Bureau of Land Management

Environmental Assessment
Marys River Oil and Gas Exploration Project

DOI-BLM-NV-E030-2013-0007-EA

File Numbers:
NVN-088625,
NVN-088620,
NVN-081212,
NVN-086576,
NVN-088623

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March 2014

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List of Abbreviations and Acronyms

µg/m^3	micrograms per cubic meter
ADT	average daily traffic
af/yr	acre-feet per year
amsl	above mean sea level
AO	Authorized Officer
APDs	Applications for Permit-to-Drill
APE	Area of Potential Effect
AQRVs	Air Quality Related Values
Aqua Program	Aquifer Quality Assessment Program
AUMs	animal unit months
BAPC	Bureau of Air Pollution Control
BAQP	Bureau of Air Quality Planning
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BCC	Birds of Conservation Concern
BCR	Bird Conservation Regions
BEA	Bureau of Economic Analysis
BGEP	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMPs	Best Management Practices
BOPE	Blowout Preventer Equipment
Brennan	J.C. Brennan & Associates, Inc.
BSCs	biological soil crusts
BTEX	benzene, toluene, ethyl benzene, and xylene
BWQP	Bureau of Water Quality Planning
^{o}C	degrees centigrade
CAS	Chemical Abstract Service
CASTNET	Clean Air Status and Trends Network
CESAs	Cumulative Effects Study Areas
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CMP	Comprehensive Management and Use Plan
CNHT	California National Historic Trail
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COAs	Conditions of Approval
CR	County Road
CRA	Cultural Resource Analysts, Inc.
CSPRR	Central and Southern Pacific Railroad
dB	decibels
DOI	U.S. Department of the Interior
DPS	Distinct Population Segment
DRI	Desert Research Institute
EA	Environmental Assessment
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
^{o}F	degrees Fahrenheit

FEMA	Federal Emergency Management Agency
FLMs	Federal Land Managers
FLPMA	Federal Land Policy and Management Act
FML	federal mineral lease
FMUs	Fire Management Units
GHGs	greenhouse gases
GIS	Geographic Information System
GWP	Global Warming Potential
HAPs	hazardous air pollutants
HUC	Hydrologic Unit Code
HWA	Hayden-Wing Associates
IDA	International Dark-Sky Association
IM	Instruction Memorandum
IMPROVE	Interagency Monitoring of Protected Visual Environments
JBR	JBR Environmental Consultants, Inc.
KCL	potassium chloride
km	kilometer
LIDAR	light detection and ranging
MBTA	Migratory Bird Treaty Act
MLA	Mineral Leasing Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
MSDS	Material Data Safety Sheets
MSUPO	Master Surface Use Plan of Operations
MWD	measurement while drilling
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NADP	National Acid Deposition Program
NAGPRA	Native American Graves Protection and Repatriation Act
NAIP	National Agricultural Imagery Photography
NDEP	Nevada Division of Environmental Protection
NDETR	Nevada Department of Employment, Training and Rehabilitation
NDOA	Nevada Department of Agriculture
NDOM	Nevada Division of Minerals
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDT	Nevada Department of Taxation
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
Nevada AAQS	Nevada Ambient Air Quality Standards
NGSCT	Nevada Governor's Sage-grouse Conservation Team
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NO_2	nitrogen dioxide
NOx	nitrogen oxides
Noble	Noble Energy, Inc.
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NSDO	Nevada State Demographer's Office
NTN	National Trends Network
NTSA	National Trails System Act
NTT	National Technical Team

NWI	National Wetland Inventory
NWS	National Weather Service
O_3	ozone
OCTA	Oregon and California Trails Association
OHV	off-highway vehicle
PFYC	Potential Fossil Yield Classification
PGH	Preliminary General Habitat
PM_{10}	particulate matter less than 10 microns in effective diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in effective diameter
PMU	Population Management Unit
PPH	Preliminary Priority Habitat
ppm	parts per million
PSD	Prevention of Significant Deterioration
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFFAs	Reasonably Foreseeable Future Actions
RMP	Resource Management Plan
ROW	Right-of-Way
RV	recreational vehicle
SAD	Surface Area Disturbance
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SOx	sulfur oxides
SPRR	Southern Pacific Railroad
SR	State Route
SVR	Standard Visual Range
tpy	tons per year
TRMP	Trails Regional Mitigation Plan
UIC	Underground Injection Control
UPRR	Union Pacific Railroad
US	U.S. Highway
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFD	Volunteer Fire Department
VIEWS	Visibility Information Exchange Web System
VOCs	volatile organic compounds
VRM	Visual Resource Management
WCRM	Western Cultural Resource Management, Inc.
WRCC	Western Regional Climate Center

CHAPTER 1 - INTRODUCTION

1.1 IDENTIFYING INFORMATION

BACKGROUND:

In October 2012, Noble Energy, Inc. (Noble) submitted to the Bureau of Land Management (BLM) a Master Surface Use Plan of Operations (MSUPO) for the proposed Marys River Oil and Gas Exploration Project (Project or Proposed Action). The MSUPO was updated in January 2013 and in March 2014 (Noble, 2014). The Proposed Action is for a maximum of 20 wells on up to 20 well pads including construction, drilling, completion, production/operation, and abandonment. Because this is an exploration program, Noble has identified 33 potential well pad locations within the project area; however, no more than 20 well pad locations would be constructed over a period of two or more years. During the fall of 2012, Noble conducted a 3D Seismic program within the Marys River project area. Noble would use the results of the seismic program, previous 2D geothermal seismic programs, and previous well results from the project area to select locations that minimize the likelihood of encountering drilling hazards and increase the understanding of faults which may act as a conduit for fluids in the reservoir.

During the first year, Noble proposes to either construct two well pads (each well pad with one production well and one seismic listening well) or four well pads with one production well on each pad. The seismic listening wells may later be converted to production wells. The remainder of the well pads and wells (up to 20 well pads and 20 wells) would be constructed during the following years. The wells would be produced for an estimated 20 years. Within the project area, existing roads would be used, some roads would require upgrading, and new local and resource roads would be required to access the well pads. Noble has identified 33 potential well pad locations within the project area; however, no more than 20 well pads would be constructed. The Proposed Action would begin once all permits and approvals are obtained.

NUMBER: DOI-BLM-NV-E030-2013-0007-EA

CASEFILE/PROJECT NUMBER: NVN-088625, NVN-088620, NVN-081212, NVN-086576, NVN-088623

PROJECT NAME: Noble Energy – Marys River Oil and Gas Exploration Project

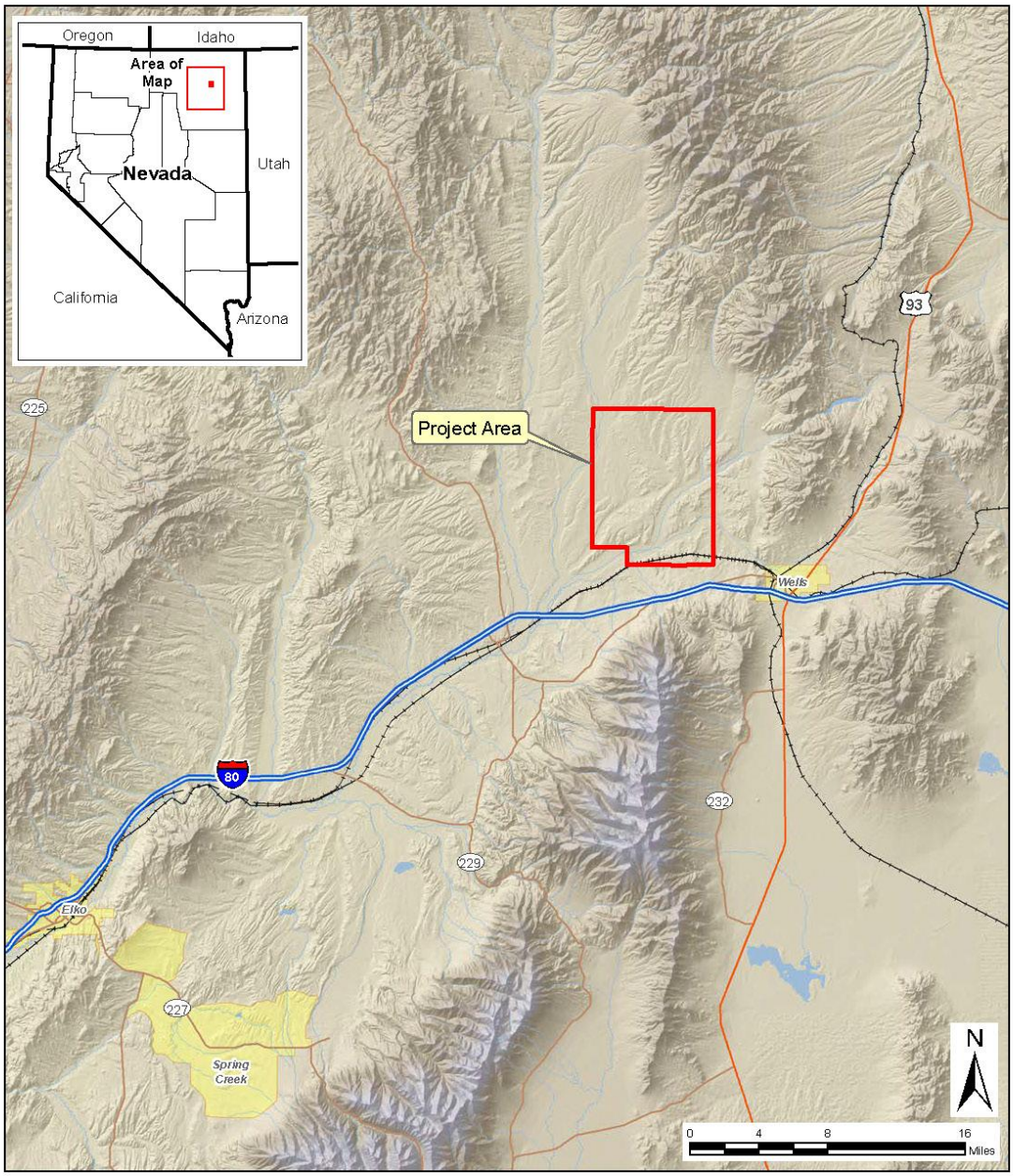
PLANNING UNIT: Elko District, Wells Field Office

1.1.1 PROJECT LOCATION

The project area is located in Elko County, Nevada approximately 4 miles northwest of Wells and approximately 36 miles northeast of Elko on the north side of Interstate-80. General access to the project area from Elko and Wells is via Interstate-80 to Starr Valley Road (State Route - SR 230/Exit 333) and proceeding north on county roads (see Map 1.1-1). Access is described in detail in the Transportation Plan (Appendix A).

1.1.2 SURFACE AND MINERAL OWNERSHIP

The Marys River project area encompasses approximately 39,444 acres in Elko County. Surface and mineral ownership within the project area is shown in Table 1.1-1. Surface ownership is provided on Map 1.1-2.



Legend

Project Area

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MAP 1.1-1

General Location

Marys River
Oil and Gas Exploration Project

Elko County, NV

March 2014

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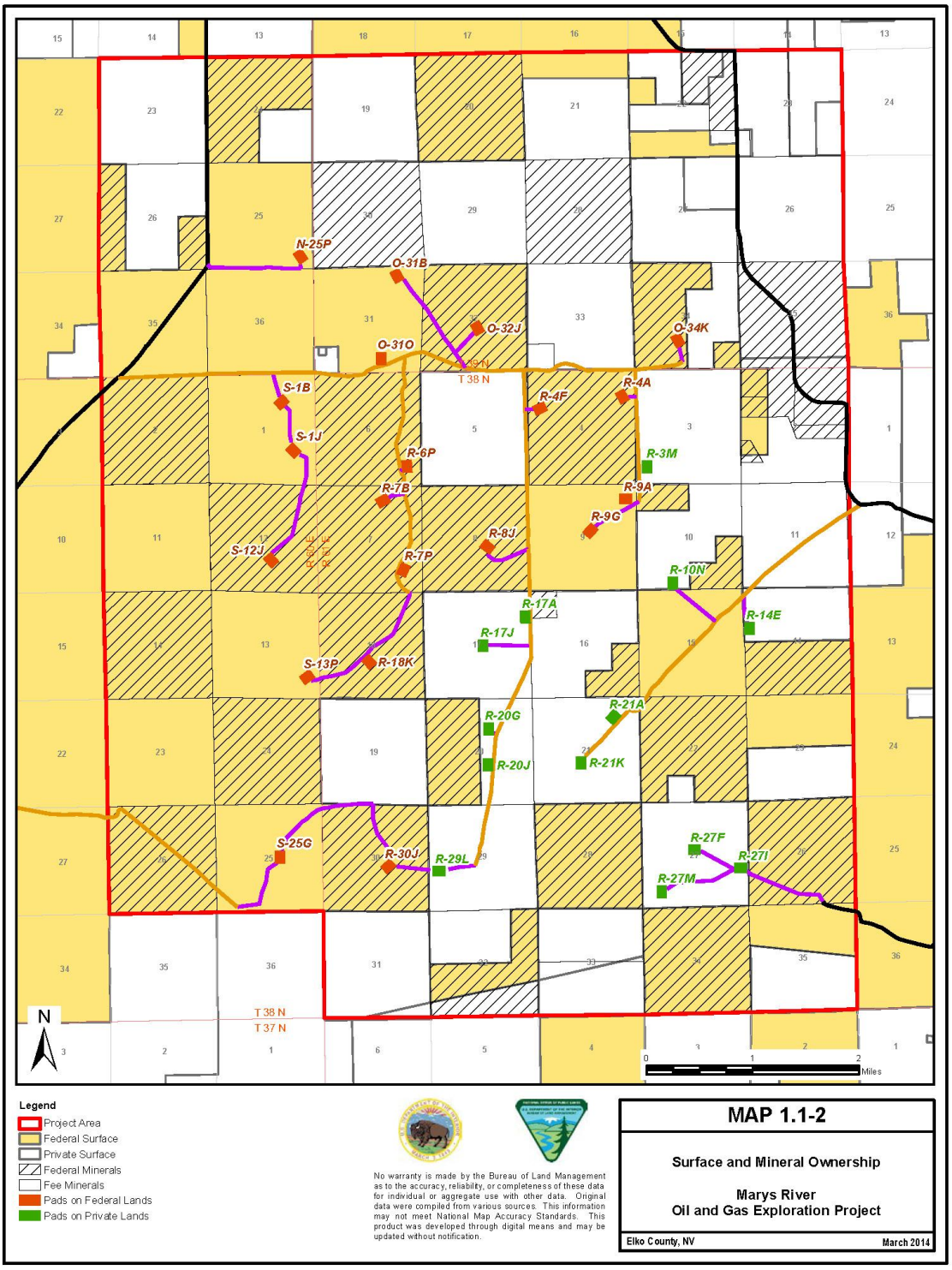
N-25P
O-31B
O-32J
O-34K
O-31O
T 38 N
S-1B
S-1J
R-4F
R-4A
R-6P
R-3M
R-7B
R-9A
R-9C
R-8J
S-12J
R-7P
R-10N
R-17A
R-14E
R-17J
S-13P
R-18K
R-20G
R-21A
R-20J
R-21K
S-25G
R-30J
R-29L
R-27F
R-27I
R-27M
T 38 N
T 37 N
N
0
1
2
Miles
Legend
Project Area
Federal Surface
Private Surface
Federal Minerals
Fee Minerals
Pads on Federal Lands
Pads on Private Lands
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MAP 1.1-2
Surface and Mineral Ownership
Marys River
Oil and Gas Exploration Project
Elko County, NV
March 2014

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Table 1.1-1
Surface and Mineral Ownership in the Project Area

Surface/Mineral Ownership	Area (acres)	Percent
Federal/Federal	13,410	34.0
Private/Federal	2,606	6.6
Private/Private	15,335	38.9
Federal/Private	8,093	20.5
Total	**39,444**	**100.0**

1.1.3 NAME AND LOCATION OF PREPARING OFFICE:

BLM Wells Field Office, Elko District, Nevada

1.2 PURPOSE AND NEED

The purpose of the Proposed Action is for Noble to explore for oil and gas to verify the resources within the project area.

The need for the Proposed Action stems from the BLM's legal responsibility to respond to Noble's MSUPO (Noble, 2014) for oil and gas exploration under its mandate to manage public lands according to the Federal Land Policy and Management Act (FLPMA) and the Mineral Leasing Act (MLA), as amended.

1.3 PLAN CONFORMANCE REVIEW

The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 Code of Federal Regulations (CFR) 1610.5, BLM 1617.3):

The Proposed Action is in conformance with the Wells Resource Management Plan (RMP – BLM, 1983), as approved June 23, 1985. The Record of Decision for the Wells RMP, page 25, provides that, "The public lands will be managed in a manner which recognizes the Nation's needs for domestic sources of minerals." As a standard operating procedure, the RMP prescribes that, "Time-of-day and/or time-of-year restrictions will be placed on construction activities associated with leasable and saleable mineral explorations and/or development that are in the immediate vicinity or would cross crucial sage-grouse, crucial deer and pronghorn antelope winter habitats, antelope kidding areas, or raptor nesting areas." The Proposed Action is also in conformance with all amendments to the Wells RMP.

1.4 PUBLIC PARTICIPATION

As part of the National Environmental Policy Act (NEPA) process, a news release was published, outlining the Proposed Action as well as the BLM's intent to prepare an Environmental Assessment (EA) analyzing the proposal. The proposal, the news release, and a map were posted to the BLM Elko District website at www.blm.gov/rv5c. Letters were sent to interested parties soliciting input on potential issues, impacts, and alternatives. Tribal consultation letters were sent to 10 tribes and four non-governmental organizations notifying them of the Proposed Action and requesting input. The BLM invited the public to provide comments on the proposal for 30 days beginning December 6, 2012. The public comment period ended on January 4, 2013. Following the scoping period, on March 14, 2013, BLM held a public forum in Elko to address hydraulic fracturing related to oil and gas exploration.

During the comment period, six comment letters were received: two from state agencies, two from environmental advocacy groups, and two from private individuals. Comments were categorized by topic and each comment was given an identification number. Comments

received during the public comment period are summarized below and were considered during the impact analysis.

Air Quality. Comments expressed concern that emissions will affect air quality. One comment cited potential impacts to climate change.

General. General comments recommended preparing an Environmental Impact Statement (EIS), rather than an EA, to assess all environmental and human health impacts. An evaluation of all reasonable alternatives was requested. Comments identified missing or confusing information in the MSUPO.

Geology and Soils. Concern was expressed over geological implications from hydraulic fracturing, and seismic effects and impacts to subsurface geology from drilling. Information was requested regarding the source of soil for burying drill cuttings.

Hazardous Materials. Information was requested on hydraulic fracturing fluid composition, use of sand as a proppant, use of radioactive tracers, handling of drilling mud and cuttings, handling of normally occurring radioactive material excavated through the bore hole, and an explanation of a closed-loop system.

Socioeconomics. Commenter recommended making every effort to assure the safety of families living in the project area.

Visual Resources. Concern was expressed regarding mitigation of lighting impacts. Suggestions were made regarding minimizing visual impacts through use of screening, appropriate structure colors, and careful site placement, as well as avoidance of new roads when possible.

Vegetation. The seed mix was requested and information was requested regarding root structures of local vegetation.

Wildlife. Comments expressed concern over potential impacts to sage-grouse and other species (pygmy rabbits, pronghorn, and burrowing owls) living in the sagebrush community. Recommendations were made to minimize impacts to pronghorn, pygmy rabbits, and golden eagles. Concern was expressed over the potential for poaching. Comments suggested a more thorough evaluation of the current status of wildlife populations compared with historic or potential habitat capacity.

Wetland and Water Resources. Concern was expressed regarding possible impacts to wetlands and riparian communities associated with the upper Humboldt River in the project area. Additional information was requested regarding use of polluted water for agricultural purposes, water quality impacts from hydraulic fracturing, the use of treatment facilities, monitoring of potential water impacts, and extraction, storage, and disposal of produced water.

1.5 DECISIONS TO BE MADE

The BLM's authority for approving oil and gas exploration is listed in 43 CFR 3151. The BLM's approval of oil and gas activities is subject to conditions to prevent undue or unnecessary degradation of public lands and is consistent with the 1985 Wells RMP and the District-wide EA for oil and gas leasing completed in September 2005 (BLM, 2005).

This EA was prepared in conformance with the policy guidance provided in the BLM's NEPA Handbook H-1790-1 (BLM, 2008a). The BLM Handbook provides instructions for compliance with the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR §1500-1508) and the U.S. Department of the Interior (DOI) Manual 516 DM 1-7 on NEPA compliance (DOI, 2005).

The BLM decision-makers will decide, based on the analysis contained in this EA, whether or not to authorize the Project with Conditions of Approval (COAs). The Decision Record associated with this EA will not constitute the final approval for any actions, such as approval of all individual Applications for Permit-to-Drill (APDs), Rights-of-Ways, and Sundry Notices associated with the Proposed Action. It does, however, provide the BLM Authorized Officer (AO) with information upon which to consider approving individual project components such as APDs, Rights-of-Ways, and Sundry Notices.

1.6 FEDERAL, STATE AND LOCAL PERMITS OR APPROVALS

Permits and approvals that may be required for the project are listed in Table 1.1-2.

Table 1.1-2
Required Permits and Approvals

Permits and Approvals	Agency
BLM Right-of-Way Grant (SF 299 Application)	Bureau of Land Management
Temporary Use of BLM Administered Land	Bureau of Land Management
Use of BLM Administered Land	Bureau of Land Management
BLM Permit to Drill	Bureau of Land Management
Completion Report	Bureau of Land Management
Elko County Road Maintenance Agreement	Elko County Roads Department
Elko County approval for road and bridge use	Elko County Roads Department
Housing Facilities Permit	Nevada Bureau of Health Protection Services, Health Division
Permit to Drill an Oil or Gas Well	Nevada Commission on Mineral Resources, Division of Minerals
Well Completion Report	Nevada Division of Minerals
Oilfield Water Production and Disposal Well	Nevada Department of Environmental Protection (NDEP)
Air Quality Operating Permit	NDEP Bureau of Air Pollution Control
Surface Area Disturbance Permit	NDEP Bureau of Air Pollution Control
Transient Non-Community Public Drinking Water System Permit	NDEP Bureau of Safe Drinking Water
Permit to install domestic wastewater holding tanks at on-site temporary crew quarters	NDEP Bureau of Water Pollution Control
Over-Dimensional Vehicle Permit	Nevada Department of Transportation
Water Well Drilling Permit Waiver	Nevada Division of Water Resources
Water Use Permit	Nevada State Engineer

CHAPTER 2 - PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

The purpose of this chapter is to describe the Proposed Action as well as alternatives, both those analyzed in detail and those considered but not analyzed in detail. Alternatives analyzed in detail include the Proposed Action Alternative, the No Action Alternative, and a Visual Alternative. Under the Proposed Action Alternative, Noble has identified 33 well pads and associated access roads for construction; however, no more than 20 well pads would be constructed. Under the No Action Alternative, none of the identified well pads and associated access roads would be constructed. Under the Visual Alternative, six of the 33 well pads identified in the Proposed Action are not included and measures are added to reduce indirect visual adverse effects to 13 well pads resulting from the Proposed Action. No alternatives were identified that were considered but not analyzed in detail.

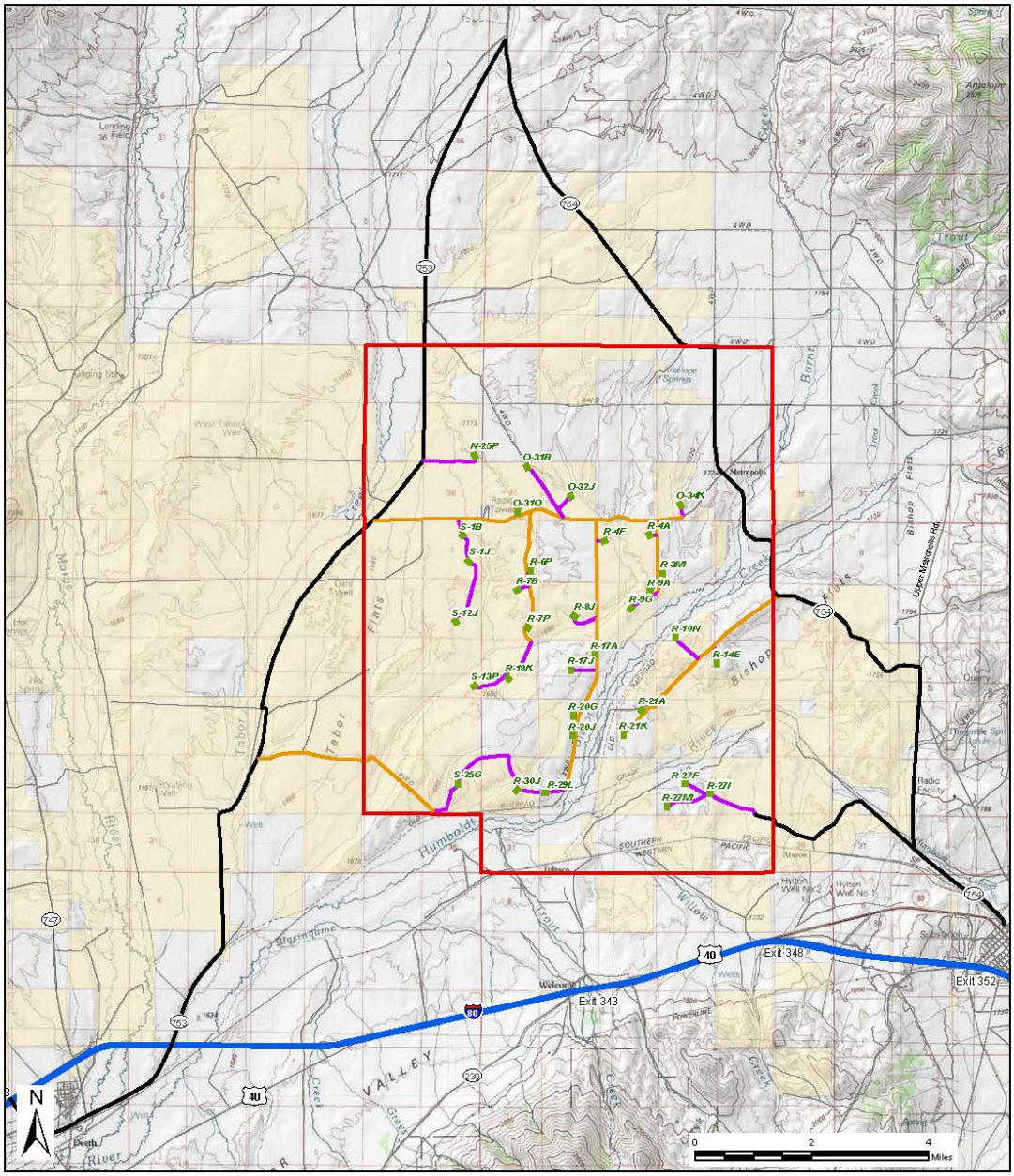
2.2 ALTERNATIVES ANALYZED IN DETAIL

2.2.1 PROPOSED ACTION

Under the Proposed Action, Noble would conduct an oil and gas exploratory drilling program in the Marys River project area. The Project would include two phases; Construction/Drilling and, if economic reserves are discovered, Production/Operations. The Construction/Drilling Phase includes construction of up to 20 well pads and drilling and completion of a maximum of 20 exploration wells over two or more years. The Construction/Drilling Phase also includes construction of new local and resource roads and upgrading of existing local and resource roads. During this phase, Noble would drill on-site water supply wells and, if economic reserves are discovered, potentially construct a disposal/injection well. Water supply and disposal/injection wells would be constructed on one of the identified 20 well pads. All of the surface disturbance associated with the Project would occur during the Construction/Drilling Phase (see Map 2.2-1). The Construction/Drilling Phase is described in detail below.

If wells produce economic quantities of oil, Noble would produce (operate) the wells for up to 20 years in the Production/Operations Phase. No additional surface disturbance would occur during the Production/Operations Phase. Details regarding the Production/Operations Phase are provided below. If drilling results in an unproductive well, the well would be plugged and abandoned in compliance with Federal Onshore Oil and Gas Orders and State of Nevada regulations within 90 days of well completion, weather permitting.

All phases of the Proposed Action would be in accordance with the Project Design Features and Best Management Practices (BMPs) provided in Noble's MSUPO (Noble, 2014). The MSUPO also includes a Transportation Plan, Fire Prevention Plan Measures, the Memorandum of Understanding (MOU) for the Aquifer Quality Assessment Program – Aqua Program, Typical Drawings, and a Narrative of Completion and Stimulation (Appendices A, D, F, H, and I to this EA, respectively). BMPs for Sage-Grouse, a Master Drilling Plan, and a Field-Wide Stormwater Pollution Prevention Plan are also included in the MSUPO. The Proposed Action would comply with all applicable Federal Onshore Oil and Gas Orders and all other applicable permits and approvals. Noble would be required to adhere to stipulations protecting sensitive resources that are included on federal leases.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O-31O
S-1B
S-1J
R-4F
R-4A
R-6P
R-3M
R-7B
R-9A
R-9G
S-12J
R-8J
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R-17J
R-18K
S-13P
R-20G
R-21A
R-20J
R-21K
S-25G
R-30J
R-29L
R-27F
R-27I
R-27M
Exit 348
Exit 343
Exit 352
Legend
Project Boundary
Surface Ownership
Federal
Private
General Access
Existing - No Improvement
Existing - Needs Improvement
New - Proposed
Interstate
Existing Secondary Roads
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
MAP 2.2-1
Proposed Action
Marys River
Oil and Gas Exploration Project
Elko County, NV
March 2014

2.2.1.1 Construction/Drilling Phase

The Construction/Drilling Phase includes well pad construction, well drilling and completion, and construction and upgrading of access roads over two or more years. During the fall of 2012, Noble conducted a 3D Seismic survey within the Marys River project area. The purpose of the 3D Seismic survey was to allow Noble to select well pad locations. Noble will use the results of the 3D Seismic survey, previous 2D geothermal seismic programs, and previous well results within the project area to select well pad locations that minimize the likelihood of encountering drilling hazards and faults which may act as a conduit for fluids in the reservoir. The seismic data would also be used to select locations which allow for separation of the hydrocarbon-bearing zones from any potential water resources of the state.

Noble has identified 33 potential well pad locations; however, no more than 20 of the well pad locations would be constructed under the Proposed Action. During the first year, Noble would either construct two well pads (each one with one production well and one seismic listening well) or four well pads with one production well on each pad. The seismic listening wells, if drilled, may later be completed as production wells.

During the second or following years, 16 well pads with 16 wells (one well per pad) may be constructed. These wells may be vertical or directional, with up to four of the proposed 16 wells drilled as horizontal wells depending on the results of other well tests.

Table 2.2-1 provides a list of the 33 potential well pads, their location, and surface and mineral ownership. Table 2.2-2 provides a list of the federal leases that could be potentially affected by the Proposed Action, the well pads that would apply to the lease, and a summary of the stipulations for each lease. Lease stipulations include protections for special status species, wildlife, and historic trails (see Table 2.2-2). A full listing of the federal lease stipulations is provided in Appendix G.

Table 2.2-1
Potential Well Pad Locations with Surface and Mineral Ownership under the Proposed Action

Well Pad Name	T	R	Sec	Surface Qtr/Qtr	Surface Ownership	Mineral Ownership
N-25P	39N	60E	25	SESE	Federal	Private
O-31B	39N	61E	31	NWNE	Federal	Private
O-32J	39N	61E	32	NWSE	Federal	Federal
O-31O	39N	61E	31	SWSE	Federal	Private
S-1B	38N	60E	1	SWNE	Federal	Private
S-1J	38N	60E	1	NESE	Federal	Private
S-12J	38N	60E	12	NWSE	Federal	Federal
R-6P	38N	61E	6	SESE	Federal	Federal
R-7P	38N	61E	7	SESE	Federal	Federal
S-13P	38N	60E	13	SESE	Federal	Private
R-18K	38N	61E	18	NESW	Federal	Federal
R-4F	38N	61E	4	SWNW	Federal	Federal
R-4A	38N	61E	4	NENE	Federal	Federal
O-34K	39N	61E	34	SESW	Federal	Federal
R-9A	38N	61E	9	NENE	Federal	Private
R-9G	38N	61E	9	SWNE	Federal	Private
R-8J	38N	61E	8	NWSE	Federal	Federal
S-25G	38N	60E	25	NWSE	Federal	Private
R-30J	38N	61E	30	NWSE	Federal	Federal
R-7B	38N	61E	7	NWNE	Federal	Federal
R-29L	38N	61E	29	NWSW	Private	Private

Well Pad Name	T	R	Sec	Surface Qtr/Qtr	Surface Ownership	Mineral Ownership
R-27M	38N	61E	27	SWSW	Private	Private
R-27F	38N	61E	27	SENW	Private	Private
R-27I	38N	61E	27	NESE	Private	Private
R-20J	38N	61E	20	NWSE	Private	Private
R-20G	38N	61E	20	SWNE	Private	Private
R-21K	38N	61E	21	NESW	Private	Private
R-21A	38N	61E	21	NENE	Private	Private
R-17J	38N	61E	17	NWSE	Private	Private
R-17A	38N	61E	17	NENE	Private	Private
R-14E	38N	61E	14	SWNW	Private	Private
R-10N	38N	61E	10	SESW	Private	Private
R-3M	38N	61E	3	SWSW	Private	Private

Table 2.2-2
Proposed Well Pads and Lease Stipulations by BLM Lease Number[1,2]

Federal Lease Number	Effective Lease Date	Well Pad Name	Lands Included in Lease	Lease Stipulation
NVN88625	07/01/2010	O-32J O34-K	T39N R61E Section 32 Parcel NV-10-06-139	ESA – Section 7 Consultation T&E and Sensitive Species Raptor Nesting Sites Cultural Resources Sage-Grouse Brood Rearing Areas
NVN88620	07/01/2010	S-12J	T38N R60E Section 12 Parcel NV-10-06-134	ESA – Section 7 Consultation T&E and Sensitive Species Raptor Nesting Sites Cultural Resources Pronghorn Antelope Crucial Winter Range Sage-Grouse Brood Rearing Areas
NVN81212	05/01/2013	R-4F R-4A	T38N R60E Section 4 NV-05-12-655	ESA – Section 7 Consultation T&E and Sensitive Species Raptor Nesting Sites Cultural Resources
NVN86576	2/1/2009	R-6P R-7B R-7P R-8J	T38N R61E, Sec 6, 7, 8 Parcel NV-10-06-135	ESA – Section 7 Consultation T&E and Sensitive Species Raptor Nesting Sites Cultural Resources Pronghorn Antelope Crucial Winter Range Congressionally Designated Historic Trails
NVN88623	07/01/2010	R-18K	T38N R61E, Sec 16, 18 Parcel NV-10-06-137	ESA – Section 7 Consultation T&E and Sensitive Species Raptor Nesting Sites Cultural Resources Pronghorn Antelope Crucial Winter Range Sage-Grouse Brood Rearing Areas Congressionally Designated Historic Trails

[1] Of the potential 33 identified well pad locations, 13 are on private lands with private minerals, 9 are on federal lands with private minerals, and 11 are on federal lands with federal minerals (see Table 2.2-1).
[2] Proposed well pad R-30J is located on a pending oil and gas lease (NVN92168).

2.2.1.1.1 Surface Disturbance by Wellfield Component

Table 2.2-3 provides estimates of short-term and long-term disturbance for each wellfield component, such as well pads and roads. Short-term disturbance includes all disturbances for well pads and roads which would occur during the Construction/Drilling Phase (expected to last for 2 years). Long-term disturbance is that portion of the short-term disturbance remaining during the Production/Operations Phase and would persist for the life of the project, estimated to be 20 years, but would last for as long as the well produces economic quantities of oil.

Areas disturbed during the Construction/Drilling Phase, but not needed for the Production/Operations Phase, would be recontoured and reseeded during interim reclamation. During interim reclamation, temporary road disturbances and a portion of the well pad would be reclaimed immediately after construction (see Transportation Plan, Appendix A). The estimates of disturbance in Table 2.2-3 include surface disturbances on BLM-administered lands and on private lands. Approximately 65 percent of all potential disturbance (20 well pads) could occur on BLM-administered lands (surface) and 35 percent (13 well pads) could occur on private surface. Actual disturbance would be less than the identified disturbance because no more than 20 of the 33 identified well pad locations would be constructed (see Table 2.2-4).

Table 2.2-3
Identified Potential Short-Term and Long-Term Surface Disturbance as a Result of Oil and Gas Exploration under the Proposed Action

Component	Potential Length or Number of Sites	Potential Short-Term Surface Disturbance (acres)[7]			Potential Long-Term Surface Disturbance (acres)[7]		
		Federal	Private	Total	Federal	Private	Total
Well Pads[1,2]	33	140.2	91.1	231.3	100.0	65.0	165.0
New Resource Roads[3]	7.2 miles	21.1	6.7	27.8	14.4	4.6	19.0
Upgrade Resource Roads[3]	0.4 miles	0.0	1.4	1.4	0.0	1.0	1.0
Turnouts[4]	7	0.0	0.0	0.0	0.7	0.3	1.0
New Local Roads[5]	5.4 miles	24.0	1.4	25.4	17.6	1.0	18.6
Upgrade Local Roads[5,6]	20.1 miles	62.2	33.7	95.9	46.3	25.2	71.5
Total		**247.5**	**134.3**	**381.8**	**179.0**	**97.1**	**276.1**

[1] Noble identified 33 potential well pad locations and all 33 well pads are included with these estimates; however, no more than 20 of the 33 potential locations would be constructed (see Table 2.2-4). Eleven of the proposed well pads are identified on federal surface with federal minerals, nine are identified on federal surface with private minerals, and 13 are identified on private surface with private minerals.

[2] Short-term well pad disturbance before interim reclamation is estimated at 7 acres for the first six well pads and 6 acres for the remaining 14 well pads, but 7 acres is used here for all well pads. Long-term disturbance after interim reclamation could be up to 5 acres per well pad, but on average would be 3.5 acres.

[3] Based on 16 foot travel surface with 5 feet for ditches (2.5 feet on either side) for resource roads long-term disturbance. An additional 10 feet of temporary use area (short-term disturbance) would be required for construction. Disturbance would include blading and removal of vegetation.

[4] Turnouts would be 10 feet in width by 600 feet in length. Short-term disturbance is not noted for turnouts because it would be within the temporary disturbance for roads; however, it is noted as long-term disturbance.

[5] Upgrading existing local roads and constructing new local roads would have a 24 foot travel surface with 5 feet for ditches (2.5 feet on either side) representing long-term disturbance. An additional 10 feet of temporary use area (short-term disturbance) would be required for construction.

[6] Existing roads that require upgrading are approximately 12.7 feet wide. Existing disturbance (approximately 43.3 acres total) is not subtracted from the proposed disturbance footprint – all new disturbance is assumed.

[7] Total acres are taken from GIS disturbance footprint model and are not calculated by multiplying width times length divided by 43,560.

Table 2.2-4
Actual Short-Term and Long-Term Surface Disturbance
as a Result of Oil and Gas Exploration under the Proposed Action[1]

Component	Potential Length or Number of Sites	Actual Short-Term Surface Disturbance (acres)[6]	Actual Long-Term Surface Disturbance (acres)[6]
Well Pads[1,2]	20	126.0	100.0[2]
New Resource Roads[3]	7.2 miles	27.8	19.0
Upgrade Resource Roads[3, 4]	0.4 miles	1.4	1.0
Turnouts[5]	7	0.0	1.0
New Local Roads[3]	5.4 miles	25.4	18.6
Upgrade Local Roads[3,4]	20.1 miles	95.9	71.5
Total		**276.5**	**211.1**

[1] Actual estimated short-term and long-term disturbance cannot be divided between federal and private surface/minerals. The 20 selected well pads could occur on any combination of lands.
[2] Long-term disturbances would be up to 5.0 acres per well pad and would average 3.5 acres.
[3] Assumes all resource and local road construction and upgrades would be required.
[4] Existing roads that require upgrading are approximately 12.7 feet wide. Existing disturbance (approximately 43.3 acres total) is not subtracted from the proposed disturbance footprint – all new disturbance is assumed.
[5] Turnouts would be 10 feet in width by 600 feet in length. Short-term disturbance is not noted for turnouts because it would be within the temporary disturbance for roads; however, it is noted as long-term disturbance.
[6] Total acres are taken from GIS disturbance footprint model and are not calculated by multiplying width times length divided by 43,560.

Well Pads

Noble has identified 33 potential well pad locations; however, no more than 20 of the 33 well pads would be constructed under the Proposed Action. Noble will use the results of the 3D Seismic program, previous 2D geothermal seismic programs, and previous well results from the project area to select locations for the 20 well pads. Noble would construct up to four well pads the first year and up to 16 well pads the second year and beyond. Noble estimates that constructing a new well pad would disturb approximately 7.0 acres for the first six well pads and 6.0 acres for the remaining 14 well pads. Well pad sizes vary because Noble would be able to reduce the size of the well pads once they have developed a few well pads and determined which techniques work best. The 20 selected well pads could occur on any combination of federal or private surface and minerals.

Well pads would be constructed from the native soil and rock materials present in the project area using a bulldozer, grader, front-end loader, or backhoe. Pads would be constructed by clearing vegetation, stripping and stockpiling topsoil, and leveling the pad area using cut-and-fill techniques. The tops of cut banks and pad corners may be rounded to improve their appearance. A typical drilling location for the first six well pads would be 535 feet by 555 feet (7.0 acres), which would allow enough space for cuts and fills, topsoil storage, and stormwater control BMPs (see Figure 2.2-1). The remaining well pads (up to 14) would not exceed 6 acres.

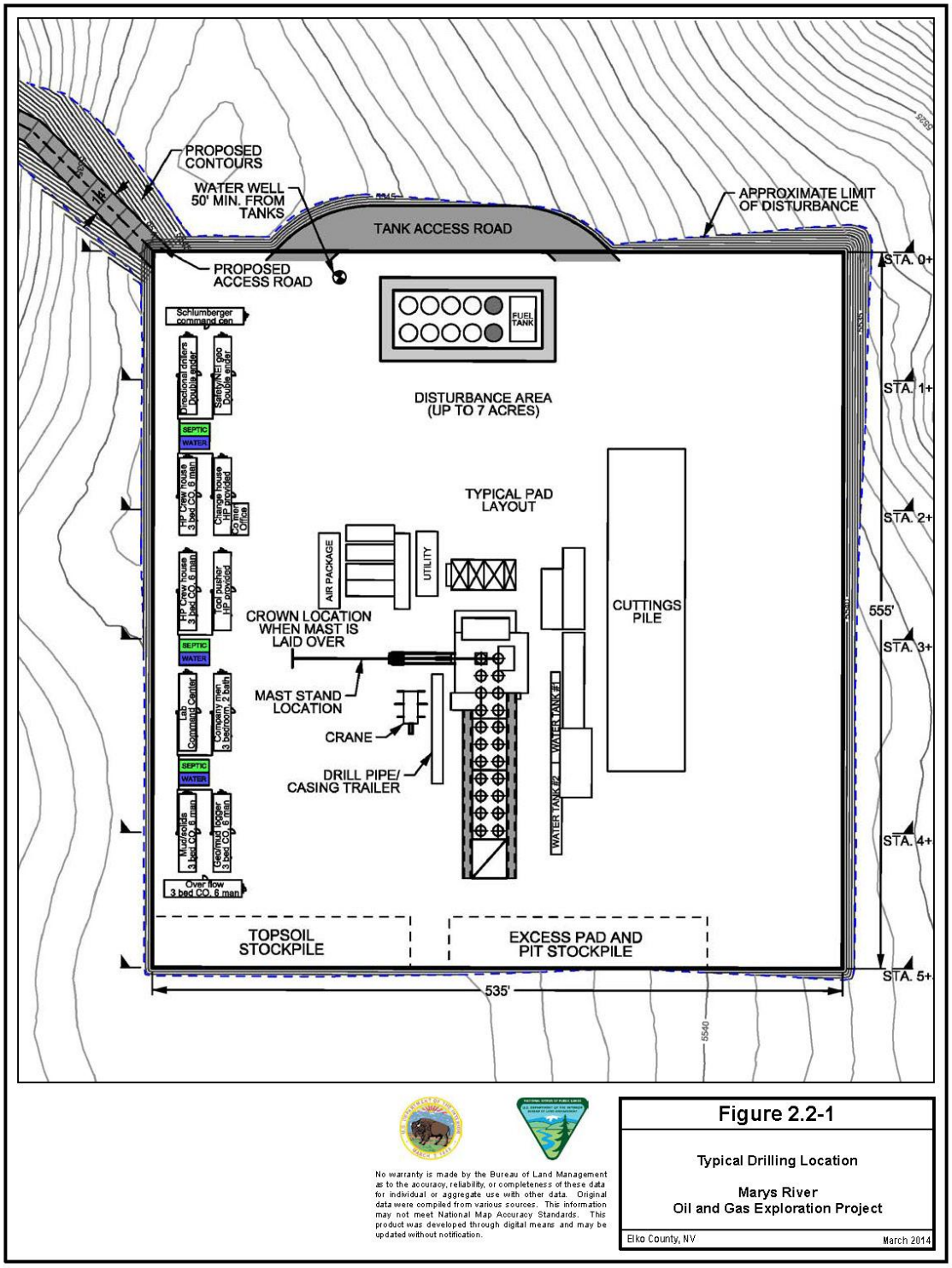

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Figure 2.2-1

Typical Drilling Location

Marys River
Oil and Gas Exploration Project

Elko County, NV — March 2014

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Roads

Noble would use existing county roads to access the project area, and some Wells city streets to access the eastern portion of the project area (access routes are described above in Section 1.1.1). The Proposed Action includes construction of new local and resource roads within the project area and seven road turnouts. Up to 7.2 miles of new resource roads would generally require a 31-foot disturbance width. An additional 10 feet of temporary disturbance would be required during construction. Final road width would be 21 feet with a 16 foot running surface (see Figure 2.2-2). Approximately 5.4 miles of new local roads would generally require a 39-foot width for construction (including 10 feet of temporary disturbance). Disturbance would include blading and removal of vegetation. Final road width would be 29 feet with a 24 foot running surface (see Figure 2.2-3). Upgrading of up to 20.5 miles of existing two-track roads (18.5 miles within the project area and 2 miles outside the project area) would occur within and outside the disturbance of existing two-track roads. Noble has identified seven turnout locations where the visible distance on roads would be less than 1,000 feet. Each turnout would be approximately 10 feet wide by 600 feet long and would be within the temporary disturbance for road construction. The Transportation Plan (Appendix A) discusses the construction procedures and measures that Noble would use to upgrade existing roads and construct new roads.

For purposes of analysis, it is assumed that all road construction and upgrading would occur even though no more than 20 of the 33 identified well pads would be constructed. It is not possible to determine which roads would be constructed and upgraded to support the 20 well pads. Depending on which 20 of the 33 well pads are constructed, road construction and upgrading would be less than that estimated for 33 well pads. The well pads selected for development would determine which existing roads would be upgraded and which new roads would be constructed. The locations of potential roads that would require upgrading and those that would be constructed to access the well pads are shown on Map 2.2-1.

The roads would be crowned, ditched, and graveled in compliance with the BLM and Forest Service *Surface Operating Standards and Guidelines for Oil and Gas Development*, also known as the *Gold Book* (BLM and Forest Service, 2007), and would meet standards set forth in BLM Road *Manual 9113* (BLM, 2011). Existing roads would be maintained in conditions equal to or better than conditions that existed prior to commencement of the Proposed Action. All equipment and vehicles would be confined to the routes shown on Map 2.2-1. Maintenance of the access roads would continue until well abandonment and final reclamation of the well pads. Road maintenance is described in detail in the Transportation Plan (Appendix A).

2.2.1.1.2 Well Construction and Completion, and On-Site Accommodations

Well construction includes several activities, starting with well drilling, casing, and testing (evaluation of drill cutting, geophysical logging, and/or drill stem testing). If economic resources are identified, the wells would be completed by additional testing, to ensure casing strength, casing perforation and if necessary, well stimulation (by hydraulic fracturing).

Well Construction

The Humboldt, Indian Well, and Elko formations would be targeted during drilling. The target zone for the wells is between 7,000 and 14,000 feet true vertical depth. Targets for possible horizontal wells would be determined by the results of the vertical/directional wells. The length of the horizontal sections (if drilled) is not known but generally would not exceed 9,000 feet in length. Fewer wells could be drilled during exploration than are proposed, depending on well test results and geologic and market uncertainties.

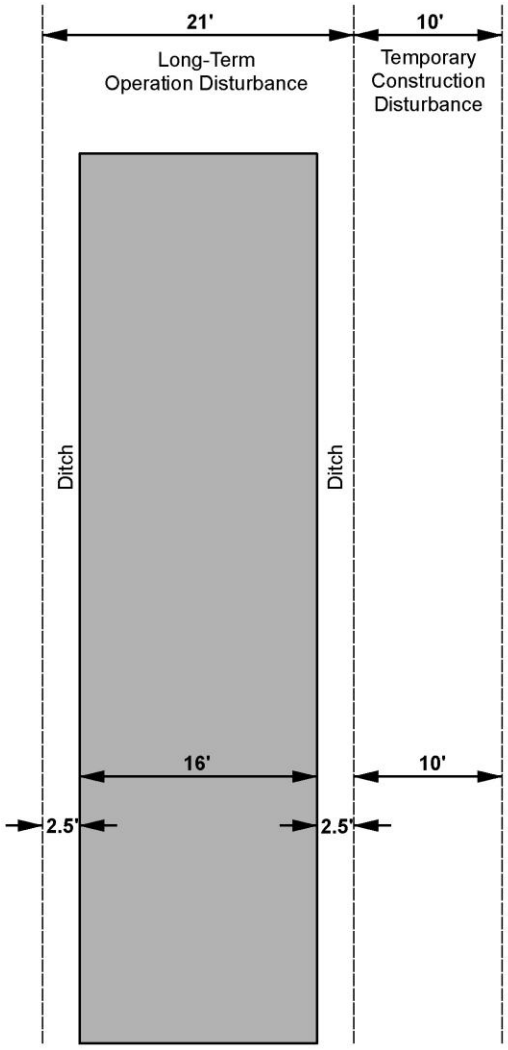

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Figure 2.2-2

Resource Road
Disturbance Footprint
Marys River
Oil and Gas Exploration Project

Elko County, NV — March 2014

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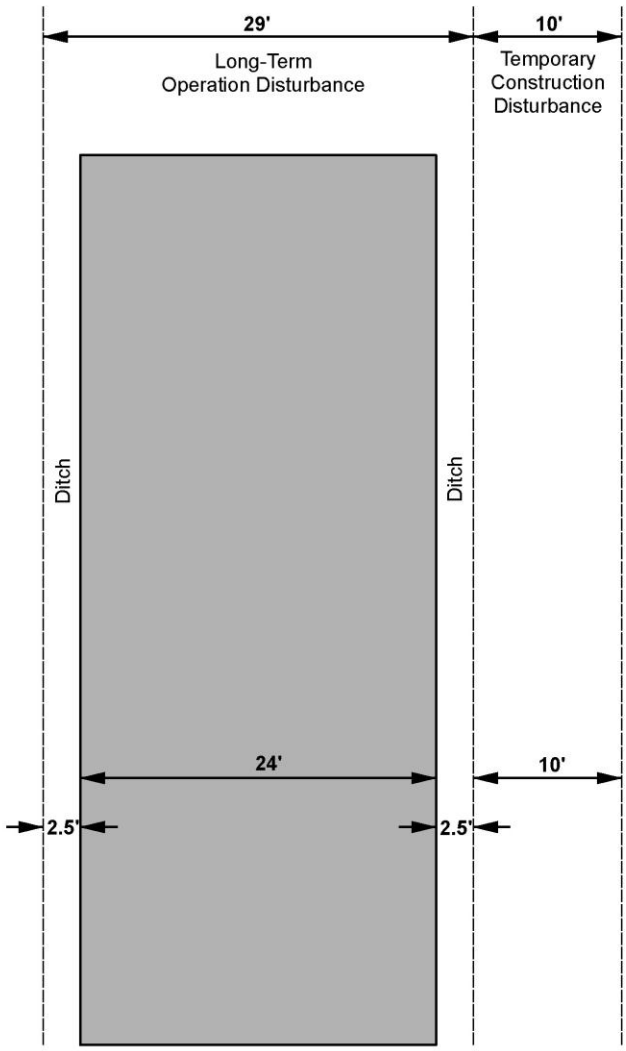

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Figure 2.2-3

Local/Collector Road
Disturbance Footprint
Marys River
Oil and Gas Exploration Project

Elko County, NV — March 2014

Drilling would be conducted in compliance with all Federal Onshore Oil and Gas Orders, as well as all other federal, state, and local rules and regulations. In Nevada, permitting and regulation of the oil and gas industry are also overseen by the Nevada Division of Minerals (NDOM). Noble anticipates that one drilling rig and one completion team would be required during the first year, and that two drilling rigs and one completion team could be required during the second year and beyond. Initially, one well would be drilled per pad unless Noble determines that they should be drilled in pairs for micro-seismic listening purposes during fracture stimulation.

Any usable water zones encountered during drilling would be adequately protected in accordance with the Federal Onshore Oil and Gas Orders and the 43 CFR 3100 regulations by installing surface or intermediate casing as approved by the BLM AO and reported. All usable water zones, potentially productive hydrocarbon zones, and valuable mineral zones would be isolated.

Noble would use a closed-loop drilling system which eliminates the requirement for reserve pits. Without a closed loop system, drilling fluids (mud, water, additives) are circulated through the wellbore and subsequently deposited, along with drill cuttings, in a pit dug near the well to hold used drilling fluids and cuttings. In the proposed closed-loop system, the pit is replaced with a series of storage tanks that separate liquids and solids. This equipment minimizes the amount of drilling waste muds and cuttings that require disposal and maximizes the amount of drilling fluids that are recycled and reused in the drilling process.

Drilling would be performed with circulation of an inert bentonite water-based mud, with various viscosity and density-adjusters such as polymers and barite. Density is adjusted to lift cuttings and suppress formation fluid pressure. Other additives may be used to stabilize borehole wall expansive clays. Drilling mud lubricates and cools the bit and flushes cuttings to settling tanks at the surface. Drilling mud would be displaced from the well bore in each separate casing setting and cementing event (surface, intermediate, and production casings). Cuttings would be buried on-site after testing (i.e., land farmed). It is not anticipated that soil would be imported to cover the cuttings.

Two casing strings would be installed in every borehole, and three in boreholes which are fully completed and tested. Surface casing would be set and cemented in place to a depth to isolate upper aquifers. Blowout Preventer Equipment (BOPE) would be welded to the top of the surface casing to contain unexpected fluid blowouts. The surface casing would be set in a competent bed and cemented with sufficient cement to fill the outer casing (annular) space, and set to a minimum depth of 500 feet (based on NDOM requirements) to protect freshwater aquifers. This is below the deepest permitted water well in the project area which is 370 feet.

The surface hole would be cased with steel casing and cemented in place entirely from ground level to the depth as determined in the individual APD. Prior to drilling below the surface casing, BOPE would be installed on the surface casing and both the BOPE and the surface casing would be tested for pressure integrity. The BOPE and related equipment would meet the minimum requirements of Federal Onshore Oil and Gas Order No. 2, and the BLM AO would be notified in advance to witness all pressure tests.

During continued drilling, intermediate casing would be set for the protection of oil, gas, usable quality water zones (if encountered), and prospectively valuable minerals deposits; for protection against abnormal pressure zones and lost circulation zones; or when otherwise required by expected well conditions (see Figures 11 and 12 in Appendix H). The casing string would be cemented with a sufficient volume of cement to cover and/or isolate all hydrocarbon

zones or other mineral deposits; to isolate abnormal pressure intervals from normal pressure intervals; and to contain any fluids with a potential to migrate and/or isolate formation fluids.

After drilling the hole to its final depth, logging tools would be run into the well to evaluate the potential hydrocarbon resource. If the evaluation indicated that adequate hydrocarbon resources were present and recoverable, steel production casing would be run and cemented into place in accordance with the well design as approved by the BLM. The entire casing and cementing program would be designed to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. BLM approval would be required prior to the use of any isolating medium other than cement.

Lighting during construction would follow "dark sky" lighting practices. Such practices are designed to reduce the effects of artificial light on the natural environment, including sky glow, glare, light trespass, light clutter, and decreased visibility at night (International Dark-Sky Association – IDA, 2014). "Dark-sky" lighting practices implemented in the project area would include, but not be limited to the following:

- using low glare lighting equipment;
- shielding security lighting so that the majority of light hits the target and does not cause glare;
- targeting lower lighting levels and better uniformity for safety and security lighting; and
- to the extent practical, aiming lighting on facilities from the top down, and away from adjacent areas.

Well Completion

After production casing has been cemented in place, the drilling rig would be removed and a completion rig would be moved in. Well completion would consist of running a cement bond log to evaluate the cement integrity and to correlate the cased hole logs to the open hole logs. The casing would then be perforated across the hydrocarbon producing zones, and the formation would be stimulated to enhance the production of oil and gas. The typical method used for stimulation consists of a hydraulic fracture treatment in which sand and fluids are pumped into the producing formation with sufficient pressure to fracture the rock formation. Hydraulic fracturing is further described in Appendix I. The sand serves as a proppant to keep the created fracture open, thereby allowing reservoir fluids to move more efficiently into the well bore. Completions are expected to take between 5 and 21 days per well. Hydraulic fracturing is part of the completion process and is expected to take between 3 and 5 days per well.

Completion fluids are custom-engineered to accomplish various objectives, including:

- Pressuring the formation through perforations in the production casing to fracture the rock, and propagate those fractures some distance into the formation;
- Carrying proppant particulates, sand, ceramic or plastic (to prop fractures open when the pressure is released), and small rubber balls to block perforations and hold injected fluids outside the casing for a short time; and
- Carrying other chemicals to "break" the gel suspending the proppant, disinfect the hydraulically fractured zone and retard microbial growth which can sour the well, and flush general residual chemicals.

Table 2.2-5 provides a tentative list of materials that may be used as completion fluid additives. Note that the list of materials does not contain diesel, which was common in fracturing fluids 10 years ago. The only constituent not fully disclosed is a proprietary amine polymer formulation ("KCl substitute") which is added in small quantities to augment clay stabilization. Most constituents are either consumed in the treatment (acid, pH buffers), inert (sand), or biodegradable. Biocide retards microbes that would otherwise grow rapidly in the guar starch, until such time as the fluid can be produced in flowback water or displaced and plugged off in a well that is abandoned.

Table 2.2-5
Tentative List of Materials for Hydraulic Fracturing

Material	Volume	Description	Purpose	Fate
Option #1: Cross-Linked Gel Sand Fracturing for Vertical Wells: 5 Stages of 150,000 lbs.				
Water	425,000 gal.	Fresh Water	Fluid basis	Flowback
Sand	35,000 lbs.	100 mesh	Very fine proppant	Inert
Sand	750,000 lbs.	Premium White Sand	Proppant	Inert
Labeled ceramic		Radioactive tracer	Ceramic proppant with trace radioactivity	Low radioactivity
LGC	5 gal/1000g	Liquid Gel Concentrate	Guar (legume) starch	Biodegradable
Breaker	2.5 gal/1000g	Gel Breaker	Encapsulated ammonium persulfate oxidizer	Chemically degradable
HCl	1000 gal.	15% Hydrochloric Acid	Muriatic acid, cleaner and breaker	Neutralized by rock
Corrosion inhibitor	0.5 gal/1000g	In acid solution only	Retards acid attack on steel	Adheres to steel
Citric Acid	50 lbs/1000g	In acid solution only	Sequesters dissolved iron and prevents rust coat	Biodegradable
Ball Sealers	1000 ea.	5/8" diam rubber balls	After fracturing, plug perfs and hold well pressure	Inert
KCl	2% in Water	Potassium Chloride	Formation clay stabilizer	Sorbed to borehole wall clay
"KCl Substitute"	1 gal/1000g	Proprietary polymer	Clay stabilizer	Biodegradable, and sorbed
Biocide	0.2 gal/1000g	Dibutyl normal propanamine	Disinfectant	Biodegradable
Cross Linker	2.25 gal/1000g	Borate X-linker with caustic	Forms gel in guar starch	Disperses at neutral pH
Buffer	0.5 gal/1000g	Formic Acid	Weak acid, pH regulator	Biodegradable
Non-emulsifier	1.0 gal/1000g		Soap	Flowback
Lithium bromide	10 mg/l concentrate	Tracer	tracer	Flowback
Option #2: Large Acid Job for Vertical Wells: Single Stage with Diversion				
Water	13,000 gal.	Fresh Water	Fluid basis	Flowback
HCl	100,000 gal.	15% Hydrochloric Acid	Muriatic acid, cleaner and breaker	Neutralized by rock
Ball Sealers	1000 ea.	5/8" diam. RCN Ball Sealers	After fracturing, plug perfs and hold well pressure	Inert
Citric Acid	50 lbs/1000g	Iron Sequestrant	Sequesters dissolved iron and prevents rust coat	Biodegradable
Surfactant	2 gal/1000g	Friction Reducer		
Demulsifier	1.0 gal/1000g			
Biocide	0.2 gal/1000g	Dibutyl normal propanamine	Disinfectant	Biodegradable
Corrosion inhibitor	0.5 gal/1000g	In acid solution only	Retards acid attack on steel	Adheres to steel
KCl	2% in Water	Potassium Chloride	Formation clay stabilizer	Sorbed to barehole wall clay
Option #3*: Cross-Linked Gel Sand Fracturing for Directional wells: 10 Stages of 150,000 lbs. (Double all volumes of Option #1) (Large Acid Job Option not recommended for Directional Wells) *May be used later in exploration.				

Lithium bromide would be added to injected water as a tracer and may be used to affirm casing integrity and locate fracture paths. It exists in solution as ions which are not readily adsorbed to solids or reacting with outer solutes, and would migrate at the same rate as the carrying fluid. Lithium bromide is included in the sampling parameter list in the Aqua Program (see Appendix F) because it can function as an identifying signature in the event the fluid is suspected to have reached a well or spring.

The radioactive tracer, if used, would be a low-level radioactive additive which requires operator training but no special handling measures, and can be detected outside the casing by sensitive logging tools. These substances are either recovered in flowback water which is disposed of, or may remain sealed in the subsurface if the well is plugged. Some radioactive tracer is inserted in ceramic proppant so that it can indicate fracture strength, and some may be alloyed into casing collars to identify them in logs. All radioactive tracer material use is strictly regulated by the Nuclear Regulatory Commission (NRC) and the U.S. Environmental Protection Agency (EPA), in terms of storage, handling, and disposal.

Subsequent to drilling and completion, the well would be shut in under pressure, and that pressure would be monitored to assess formation pressures and the possibility of leaks, prior to final development.

On-Site Accommodations

Noble would provide on-site accommodations for drilling workers. On-site accommodations at the pad location would consist of self-contained mobile modular buildings that require no foundation or construction, and would include six units for well site support services and six units providing temporary housing quarters for up to 30 workers (see Appendix H). The on-site accommodations would require no water withdrawal from or discharge into the project area. Noble would obtain a permit from the NDEP Bureau of Safe Drinking Water to operate a public water system, to include five booster pump stations, three 3,135 gallon storage tanks, and a distribution system, for the on-site accommodations. Noble would also obtain a permit from the NDEP Bureau of Water Pollution Control to install three 4,000 gallon domestic wastewater holding tanks. The water systems would provide water for showers, laundry, inside toilets, laboratories, and cooking. Noble would contract with an approved water hauler in the State of Nevada to haul potable water to the storage tanks on the well pad and haul wastewater from the pad locations to an approved disposal facility. Drinking water would be brought to the site in 5 gallon containers.

The modular buildings would be located directly on the well pad where a well was being drilled and would be removed once drilling was completed (after an estimated 50 to 65 day drilling period). Each drill crew would occupy the on-site accommodations for approximately 14 days and drilling workers would not be allowed to leave the project area. On-site accommodations would not be provided for completion workers.

Noble anticipates that one drill rig would be required during the first year and that two rigs would be used in the second year. Accordingly, on-site housing occupancy would peak in the second year, with 60 drilling workers staying in modular units placed on two pad locations. Peak traffic estimates would include up to 60 additional light vehicles per day if on-site housing was not used. Noble would obtain all appropriate permits from the BLM and the State of Nevada for on-site accommodations.

2.2.1.1.3 Water Requirements and Water Supply

During the Construction/Drilling Phase, water would be required for drilling, well completion, dust control, and temporary on-site accommodations. Water volumes required for drilling a vertical/directional well would depend on the depth of the well. Anticipated water use for drilling a vertical/directional well is approximately 10,000 barrels (420,000 gallons). The volume of water required to drill a horizontal well, approximately 30,000 barrels (1.26 million) gallons, would depend on the depth of the vertical portion of the well and the length of the horizontal section. If 16 of the 20 proposed wells are vertical/directional wells and four are horizontal wells, total water required for drilling could be up to 280,000 barrels (11.76 million gallons or 36.1 acre-feet).

Well completion (flushing and hydraulic fracturing), which establishes the flow path between the reservoir and the surface, is expected to require 20,000 barrels (840,000 gallons) for a single vertical/directional well and 200,000 barrels (8.4 million gallons) for a single horizontal well. Based on knowledge gained during the first year of construction, Noble anticipates decreasing the water required to complete a vertical/direction well to 13,000 barrels (546,000 gallons) with a goal of 6,000 barrels (252,000 gallons) per well. If 16 of the 20 proposed wells are vertical/directional wells and four are horizontal wells, total water required for completion could include up to 1,120,000 barrels (47.04 million gallons or 144.4 acre-feet). Table 2.2-6 summarizes the estimated water requirements for drilling and completion of a single well.

Table 2.2-6
Estimated Water Required to Drill and Complete a Single Well

	Drilling		Completion	
Well Type	**Barrels**	**Gallons**	**Barrels**	**Gallons**
Vertical/Directional Well	10,000	420,000	20,000	840,000
Horizontal Well	30,000	1,260,000	200,000	8,400,000

Dust control (construction and traffic) during the Construction/Drilling Phase would require an estimated 973 barrels (40,866 gallons) of water per day in the first year of exploration, and 3,891 barrels (163,422 gallons) of water per day in the second year. The volume of water required for dust control would depend on climatic conditions and would be lower if Noble used other methods to control dust, such as:

- Watering disturbed areas and dirt roads on a regular basis;
- Pre-watering areas to be disturbed;
- Graveling of roadways, storage areas, and staging areas;
- Following posted speed limits and not exceeding 20 miles per hour (mph) where not posted;
- Applying water sprays on material storage piles on a regular basis;
- Halting construction when high winds inhibit dust control;
- Using other dust suppressants such as DirtGlue, magnesium chloride, and tree sap; and/or
- Re-vegetating reclaimed areas.

Temporary on-site accommodations for drilling workers would require approximately 36 barrels (1,512 gallons) of water per day per drilling location (Noble, 2014). Noble proposes to use one drill rig during the first year of construction and two drill rigs during the second year. Therefore, water use at on-site accommodations would approximate 36 barrels (1,512 gallons) per day during the first year and 72 barrels (3,024 gallons) per day during the second year.

Table 2.2-7 summaries the Proposed Action's estimated water requirements during the anticipated two years of project construction. Approximately 243,879 barrels (10.2 million gallons) are expected to be required during the first year of construction, and approximately 1,773,015 barrels (74.5 million gallons) are expected to be required during the second year.

Table 2.2-7
Estimated Annual Water Requirements during Construction

Year and Project Activity	Water Required	
	Barrels	**Gallons**
Year 1		
Drilling[1]	40,000	1,680,000
Completions[1]	80,000	3,360,000
Dust Control[2]	116,736	4,902,912
On-Site Worker Housing[3]	7,143	300,006
Total Water Use – Year 1	**243,879**	**10,242,018**
Year 2		
Drilling[4]	240,000	10,080,000
Completions[4]	1,040,000	43,680,000
Dust Control[5]	466,944	19,611,648
On-Site Worker Housing[6]	26,071	1,094,982
Total Water Use – Year 2	**1,773,015**	**74,466,630**

[1] Based on four vertical/directional wells drilled and completed in Year 1.
[2] Based on 80 barrels of water per mile applied to 12 miles of unpaved roads (miles associated with construction of 4 pads) for 120 days.
[3] Based on 35.7 barrels of water per day consumed at one drilling location for 200 days.
[4] Based on 16 vertical/directional wells and four horizontal wells drilled and completed in Year 2.
[5] Based on 80 barrels of water per mile applied to 49 miles of unpaved roads (miles associated with construction of 16 pads) for 120 days.
[6] Based on 71.4 barrels of water per day consumed at two drilling locations for 365 days.

Water wells would be drilled on individual well pads to provide water for drilling, completions, and dust suppression during the Construction/Drilling Phase. Noble expects that on-site water wells would provide approximately 70 percent of the water required for drilling, completions, and dust control. On-site water wells from one pad could be used to supply water for drilling, completion, and dust control on subsequent pads within close proximity. Water supply wells on private land may be used by the landowner during Noble's activities and turned over to the landowner for agricultural use once Noble's activities conclude. All water uses would be permitted through the Nevada Division of Water Resources (NDWR).

Water wells may be drilled on pad locations along collector roads instead of on the production well pad. This would allow for water to be available while building long lengths of roads to pad locations and to construct the original well pad. Water may be transferred from the water well pad to the production well pad via a flexible fiber line similar to a fire hose. The line would run from the water well along the road ditch up to the drilling rig water storage tank. Water well pads would have a water well and a storage tank and would require about 1 acre of disturbance. The well pad would be expanded if it was later selected for a production well pad. In either case, the water well pad would count as one of the 20 well pads to be constructed. Overall, Noble expects that on-site water wells would provide 165,715 barrels (7 million gallons) of water during the first year of construction and 1,222,861 barrels (51.4 million gallons) of water during the second year.

Noble expects that off-site water sources would provide approximately 30 percent of the water needed for drilling, completion, and dust control, and all of the water required by on-site accommodations. Off-site water would be supplied by a water utility (City of Elko and/or City of Wells – both of which have declared their ability and willingness to sell the water). After the first year of drilling, water could be obtained by temporary conversion of agricultural water in compliance with applicable federal and state law. Overall, Noble expects that off-site water sources would provide 78,164 barrels (3.3 million gallons) during the first year of construction and 550,155 barrels (23.1 million gallons) during the second year. Water would be transported from water utilities by tanker truck over existing roads. Traffic associated with water supply and delivery is described in the Transportation Plan (Appendix A).

2.2.1.1.4 Workforce

Table 2.2-8 shows peak construction workforce estimates for the Proposed Action. The construction workforce would peak at 130 workers during the second year and would occur with two drilling rigs and one completion rig operating simultaneously. During the first year, when one drilling rig and one completion rig would be in operation, the construction workforce would include approximately 95 workers. Drilling rigs would operate 24 hours per day, 7 days per week, and well completion crews would work during daylight hours, 7 days per week.

Table 2.2-8
Estimated Peak Construction Workforce, Year 2

Construction Workforce Category	Peak Number of Workers
Well Pad and Road Construction	7
Water Well	4
Drilling[1]	60
Completion[2]	50
Water Truck Drivers[3]	6
Dust Control[4]	1
Interim Reclamation	2
Total Peak Construction Workforce	**130**

[1] Based on two drilling rigs in operation with two eight-man drilling crews per rig. Drilling crews would work alternate 12 hour shifts. Additional drilling personnel include site managers, well site consultants, mudloggers, mud engineers, solids control, directional driller, measurement while drilling (MWD), and active system aeration.
[2] Based on one completion rig in operation and 50 workers during hydraulic fracturing.
[3] Based on 30 percent of the water used for drilling and completion, and all of the water used in the on-site accommodations being delivered in 120 barrel (5,040 gallon) trucks. Assumes that 1.5 hours are required to complete a round-trip for trucks hauling water to the project area.
[4] Based on 80 barrels (3,360 gallons) of water per mile sprayed from 100 barrel (4,200 gallon) capacity trucks.

Noble expects that drilling and well completion crews would consist of non-local workers, and that other construction workers would be likely to reside in the local area. Noble expects that approximately 10 percent of the construction workforce (26 workers) would be local and approximately 90 percent (104 workers) would be non-local.

2.2.1.1.5 Traffic

Noble intends to use one drill rig in the first year of project construction. Because on-site water wells would provide approximately 70 percent of the water required for drilling, and all drilling workers would be housed on the well pad in on-site accommodations and would remain on-site

while the well is being drilled, traffic associated with drilling a single well would include approximately six vehicles per day. During the first year of the Construction/Drilling Phase, typical project-related traffic levels would occur with one vertical/directional (production) well being drilled, one vertical/directional (production) well being completed, deliveries, and dust control. At these times, project traffic would potentially include 26 light vehicle and 20 heavy vehicle round-trips, for a total of 46 round-trips per day. Noble proposes to use two drill rigs during the second and any subsequent years of construction. With two drill rigs, typical traffic levels in the project area would include 30 light vehicle round trips and 21 heavy vehicle round-trips, for a total of 51 round-trips per day (see Table 2.2-9).

There could be up to 30 additional light vehicle round-trips on the days on which drilling crews change (every 14 days). Additional traffic would also occur during periods of rig mobilization, which would include moving the modular structures sited on the well pad. Rig mobilization is expected to include 5 days for rig set-up and 5 days for rig take-down. During these 10 days, additional traffic in the project area would include nine light vehicles and 15 heavy vehicles.

Table 2.2-9
Estimated Typical Construction/Drilling Traffic in
Vehicle Round-Trips per Day, Years 1 and 2

	Peak Vehicle Round-Trips per Day		
Construction Activity	**Light Vehicle**	**Heavy Vehicle**	**Total Vehicles**
Drilling (one well)	4[1]	2[2]	6
Completion	12[3]	17[4]	29
Service and Deliveries	10[5]	0	10
Dust Control	0	1[6]	1
Total Typical Construction Traffic – Year 1[7,8]	**26**	**20**	**46**
Total Typical Construction Traffic – Year 2[7,9]	**30**	**21**	**51**

[1] Based on all drilling workers housed in on-site accommodations and remaining on-site for 14 days. Light vehicles include four miscellaneous personal vehicles per drill pad.
[2] Based on 30 percent of the water required to drill a vertical/directional well (3,000 barrels or 126,000 gallons) and all of the water used by on-site accommodations being delivered in 120 barrel capacity trucks. Includes one additional truck per day delivering supplies (e.g. casing deliveries, cement trucks, wireline logging trucks) to each drill pad.
[3] Based on completion workers carpooling in ten vehicles, and includes two supervisor vehicles.
[4] Based on 30 percent of the water required to complete a vertical/directional well (6,000 barrels or 252,000 gallons) being delivered in 120 barrel capacity trucks. Includes 15 trucks delivering equipment and materials for well completion.
[5] Includes equipment and supply deliveries and service visits.
[6] Based on one 100 barrel capacity truck applying 80 barrels (or 3,360 gallons) of water per mile per day to unpaved access roads.
[7] Because access road and pad construction, drilling the water well, drilling the production well, and interim reclamation occur sequentially at each site location, typical traffic levels include drilling, completion, service/delivery, and dust control traffic only.
[8] Based on one vertical/directional well being drilled and one vertical/directional well being completed.
[9] Based on two vertical/directional wells being drilled and one vertical/directional well being completed.

Depending on the test results of wells drilled during this first year, Noble may drill up to four horizontal wells during following years. If horizontal wells are drilled and completed, peak traffic could occur with one well pad under construction, two drill rigs and one completion team (completing a horizontal well) in operation, supplies being delivered, and dust suppression and interim reclamation being conducted. Under these conditions, peak traffic could potentially include 35 light vehicle round trips and 48 heavy vehicle round trips, for a total of 83 vehicle

round-trips per day (see Table 2.2-10). This peak traffic would only occur when completion of a horizontal well coincided with the simultaneous drilling of two wells.

Estimated peak traffic levels are based on several assumptions; the foremost being that horizontal wells are developed and that the maximum number of vehicles associated with each construction activity would travel on the same day. Typical traffic levels during construction are likely to be lower than the peak traffic estimates shown in Table 2.2-10, depending on the number of construction activities taking place and the extent of each activity being conducted.

Table 2.2-10
Estimated Peak Construction/Drilling
Traffic in Vehicle Round Trips per Day, Year 2

Construction Activity	Peak Vehicle Round-Trips per Day		
	Light Vehicle	**Heavy Vehicle**	**Total Vehicles**
Road and Pad Construction	5[1]	4[2]	9
Drilling [3]			
One vertical well	4	2	6
One horizontal well	4	2	6
Completion			
One horizontal well	12[3]	39[4]	51
Service and Deliveries[3]	10	0	10
Dust Control[3]	0	1	1
Interim Reclamation	0	1	1
Total Peak Construction Traffic	**35**	**48**	**83**

[1] Based on carpooling, with four personal vehicles for seven workers, and one supervisor light vehicle.
[2] Includes four trucks hauling gravel. Heavy equipment for road and pad construction would remain on-site.
[3] See notes for Table 2.2-9.
[4] Based on 30 percent of the water required to complete a horizontal well (60,000 barrels or 2,520,000 gallons) being hauled in 120 barrel trucks over a 5 to 21 day completion period. An additional 15 trucks would deliver equipment and materials for well completion.

2.2.1.2 Production/Operations Phase

Once wells are drilled and completed, if economically viable, they would be placed into production and operated for up to 20 years. The results of the Proposed Action would help Noble determine whether economic quantities of oil can be produced in the Marys River Area.

After all wells have been drilled on the well pad, a working area of up to 5.0 acres per well pad (3.5 acres on average) would remain disturbed throughout the Production/Operations Phase (Figure 2.2-4). This long-term disturbance would remain until the well is abandoned and the site undergoes final reclamation. Permanent stormwater controls and BMPs would be installed on the production well pad. Total long-term surface disturbance for 20 well pads is estimated at 100.0 acres but could be as low as 70.0 acres depending on the well pad size after interim reclamation. Long-term disturbance refers to bare ground and does not include reclaimed areas.

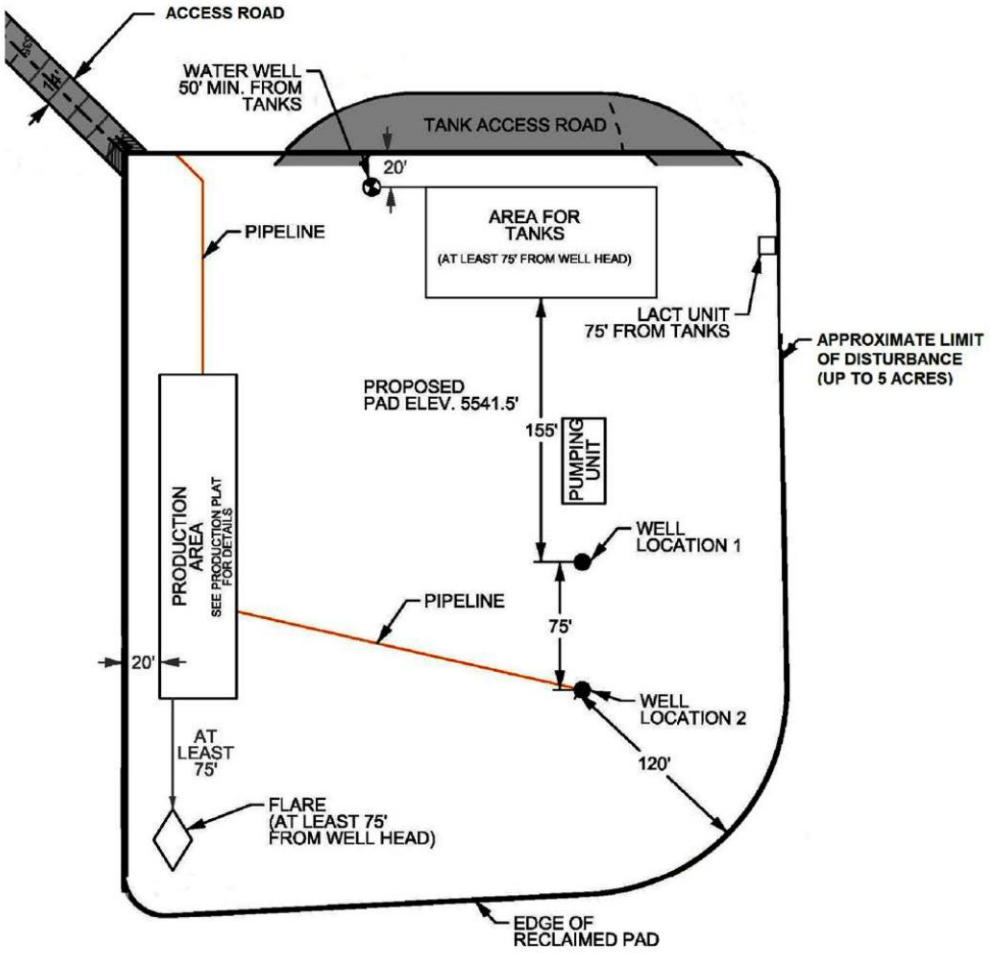

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Figure 2.2-4

Typical Production Location

Marys River
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After the Construction/Drilling Phase, production equipment would be installed on the production well pad. Equipment and facilities located on the production well pad would include the wellhead, pumping unit, vertical treater, re-circulating pump, one gas flare, two-phase separator building, line heater, generator, four 400-bbl oil tanks, two 400-bbl water tanks and one fuel tank. Typical drawings of exploration well pads showing the location of production facilities are shown in Appendix H. If two wells are located on a single well pad, production equipment would be shared to the greatest extent possible. No off-pad ancillary facilities are planned during the Production/Operations Phase.

Oil and water ("produced water") would be pumped from the wellhead, separated, and stored in tanks on-site. Noble anticipates that 12 wells could produce up to 250 barrels (10,500 gallons) of oil per day and that eight wells could produce up to 100 barrels (4,200 gallons) of oil per day. A small amount of natural gas may be produced with the oil which would be used to run the production equipment. Excess natural gas would be flared in accordance with NTL-4A (Royalty or Compensation for Oil and Gas Lost). NTL-4A allows for initial well evaluation tests, not exceeding a period of 30 days or the production of 50 million cubic feet of gas, whichever occurs first, unless a longer test period has been authorized by the appropriate State regulatory agency and ratified or accepted by the BLM.

All installed production facilities with the potential to leak or spill oil, condensate, produced water, glycol, or other fluid which might be a hazard to public health or safety would be placed within an appropriate impervious secondary containment structure that would hold 110 percent of the capacity of the largest single container within it for 72 hours. Secondary containment would consist of corrugated steel containment berms or earthen berms. Compaction and construction of earthen berms would be performed to prevent lateral movement of fluids through the utilized materials. All loading lines would be placed inside the containment berm.

All facilities or structures would be painted a natural color (or BLM Standard Environmental Color if specified by the BLM) in a non-reflective finish that blends with the background landscape. In cases of split estate associated with federal minerals, the surface equipment would be painted in accordance with BLM requirements unless the private surface owner requests differently. Permanent lighting during operations would be manually operated by operations personnel on location and would include lighting for the valve building, treater house, and load rack area. "Dark-sky" lighting practices used during the Production/Operations Phase would include low glare lighting equipment, and hooded and shielded lighting fixtures that face downward and away from adjacent areas (IDA, 2014).

2.2.1.2.1 Water Requirements and Water Supply

During the Production/Operations Phase, water may be required for dust control which would be implemented on an as-needed basis. The volume of water required for dust control would depend on annual climatic conditions, but could include up to 583,680 barrels (24.5 million gallons) per year during operations. This estimate of potential maximum water use is based on the expectation that 80 barrels of water per mile per day would be applied to approximately 61 miles of unpaved roads for 120 days. On-site water wells are expected to provide 70 percent of the annual water requirements for dust control (408,576 barrels or 17.2 million gallons) and off-site water sources are expected to provide 30 percent (175,104 barrels or 7.4 million gallons). Other methods of dust control could also be used, if approved by the BLM. Dust abatement would primarily be required if roads were not graveled. Constructing roads to Gold Book Standards may reduce water consumption for dust control.

2.2.1.2.2 Oil Production

Oil produced at the wellhead would be stored in on-site tanks located on the production well pad. Oil would be picked up in 200 barrel (8,400 gallon) tanker trucks and hauled to refineries in Salt Lake City, Utah and California.

2.2.1.2.3 Water Disposal

The amount of water recovered (including flowback of water injected during well completion and formation water condensate (produced water) in the production stream) is not readily predictable in any one well, but may be estimated for a field of many wells. Produced water is estimated to be approximately 100 barrels (4,200 gallons) per well per day for the 12 wells producing 250 barrels (10,500 gallons) of oil per day and approximately 40 barrels (1,680 gallons) per well per day for the eight wells producing 100 barrels (4,200 gallons) of oil per day. With 20 producing wells, there could be as much as 1,520 barrels (63,840 gallons) of produced water per day. Produced water would be stored in steel tanks on the production well location.

One option for produced water disposal would be to truck produced water to an approved disposal facility (Clean Harbors) between Wendover, Nevada and Salt Lake City, Utah. Another disposal option would be for Noble to convert an exploration well on one of the 20 selected well pads to a disposal/injection well and to dispose produced water in this well. The disposal/injection well would be permitted through the Nevada State Engineer's Office and NDEP as an Underground Injection Control (UIC) Class II well. Produced water, drilling fluids, and all waste associated with exploration and production of crude oil, natural gas, and geothermal energy are regulated by the federal UIC program, administered in Nevada by NDEP. Class II UIC facilities are exempted from the Resource Conservation and Recovery Act (RCRA) requirements and therefore, the standard RCRA evaluation is not required. The construction of each and every exploration well would meet specifications for a disposal/injection well, including proven isolation of the injection zone from all drinking use aquifers.

2.2.1.2.4 Workforce

Table 2.2-11 shows the peak workforce during the Production/Operations Phase. Once all wells are producing, the workforce would peak at 35 workers. The workforce could be reduced by 10 truck drivers if Noble drills and operates a produced water disposal/injection well within the project area. The number of truck drivers would also be affected by the amount of oil produced per well.

Noble expects that the pumper, maintenance worker, and produced water and dust control truck drivers would come from the local area. Oil truck drivers are expected to be non-local workers employed by crude oil transportation companies headquartered outside Elko County. With off-site produced water disposal, Noble expects that approximately 45 percent of the operations workforce (16 workers) would be local and that 55 percent (19 workers) would be non-local. If produced water is disposed in an on-site disposal/injection well, Noble expects that approximately 25 percent of the operations workforce (6 workers) would be local and that approximately 75 percent (19 workers) would be non-local.

Table 2.2-11
Estimated Peak Production/Operations Workforce

Operational Workforce Category	Peak Number of Workers
Pumper	1
Maintenance Worker	1
Oil Truck Drivers[1]	19
Produced Water Truck Drivers[2]	13
Dust Control[3]	1
Total Peak Production/Operations Workforce	**35**

[1] Based on oil production of 250 barrels (10,500 gallons) per day from 12 wells and 100 barrels (4,200 gallons) per day from eight wells transported in 200 barrel (8,400 gallon) capacity trucks.

[2] Based on 100 barrels (4,200 gallons) of produced water per day from wells producing 250 barrels (10,500 gallons) of oil per day and 40 barrels (1,680 gallons) of produced water per day from wells producing 100 barrels (4,200 gallons) of oil per day transported by truck (120 barrel capacity) to Clean Harbors. As few as three drivers could be required if produced water is disposed in an on-site disposal/injection well.

[3] Based on 80 barrels (3,360 gallons) of water per mile sprayed from 100 barrel (4,200 gallon) capacity trucks on an as-needed basis.

2.2.1.2.5 Traffic

During the Production/Operations Phase, project-related traffic would occur 5 days per week. Peak traffic is shown in Table 2.2-12 and would include one pumper truck visiting each production well pad approximately once per day, one maintenance vehicle visiting each well pad approximately 10 days per year, and one water truck applying water to unpaved roads on an as-needed basis. With total estimated oil production of 3,800 barrels (159,600 gallons) per day, 19 oil truck trips per day would be required to haul oil to refineries in Salt Lake City, Utah and California.

Table 2.2-12
Estimated Peak Production/Operations Traffic in Vehicle Round Trips per Day

	Peak Vehicle Round-Trips per Day		
Operational Activity	Light Vehicles	Heavy Vehicles	Total Vehicles
Pumper[1]	1	0	1
Maintenance[2]	1	0	1
Oil Trucks[3]	0	19	19
Produced Water Trucks[4]	0	13	13
Dust Control[5]	0	1	1
Total Production Vehicles	**2**	**33**	**35**

[1] Based on one pumper visit per day per well.

[2] Based on one maintenance truck serving all wells.

[3] Based on oil production of 250 barrels (10,500 gallons) per day from 12 wells and 100 barrels (4,200 gallons) per day from 8 wells transported in 200 barrel (8,400 gallon) trucks.

[4] Based on 100 barrels (4,200 gallons) of produced water per day from wells producing 250 barrels (10,500 gallons) of oil per day and 40 barrels (1,680 gallons) of produced water per day from wells producing 100 barrels (4,200 gallons) of oil per day transported in 120 barrel trucks. This traffic would be contained within the project area if produced water is disposed in an on-site disposal/injection well.

[5] Based on dust suppression on unpaved road surfaces occurring on an as-needed basis.

Thirteen water truck trips would be required per day to haul 1,520 barrels (63,840 gallons) of produced water to off-site disposal facilities (Clean Harbors between Wendover, Nevada and Salt Lake City, Utah). With up to 20 wells in production, peak traffic during the Production/Operations Phase could include 35 vehicle round-trips per day. Water truck traffic would be contained within the project area if produced water is disposed in an on-site disposal/injection well. With on-site produced water disposal, peak production traffic would include 22 round-trips per day. Actual traffic levels during the Production/Operations Phase would be highly dependent on the amount of oil and water produced per well, and would decrease over the life of the project due to declining well productivity.

2.2.1.3 Abandonment and Reclamation

2.2.1.3.1 Well Plugging and Abandonment

Dry/non-producing wells would be plugged, abandoned, and reclaimed within 90 days of well completion, weather permitting. Upon abandonment, each borehole would be plugged, capped, and its related surface equipment removed, and a Sundry Notice (written request for approval to perform work not covered by another type of permit) would be submitted to the BLM. This notice would describe the engineering, technical, and/or environmental aspects of final plugging and abandonment, as well as final reclamation procedures and any mitigation measures associated with final reclamation. The BLM and NDOM standards for plugging and abandonment would be followed. A configuration diagram, a summary of plugging procedures, and a job summary with techniques used to plug the wellbore (e.g., cementation) would be included in the Sundry Notice.

2.2.1.3.2 Interim Reclamation

Interim reclamation would occur according to measures described in the Marys River Reclamation Plan (Appendix C). After drilling and completion, interim reclamation would occur when the well is put into production. Noble anticipates that production well pads would be reduced to approximately 3.5 acres (on average) to accommodate production of the well and the production facilities. Interim reclamation would include:

- Disturbed surfaces to be reclaimed would be prepped and seeded, for stability and to maintain soil viability;
- Slopes would be seeded and matted with appropriate reclamation materials to prevent erosion;
- Weeds would be monitored in accordance with the Marys River Integrated Weed Management Plan (Appendix B); and
- Access roads would be maintained.

Noble would implement a baseline ecosite vegetation and weed survey for each well pad prior to construction to ensure that a BLM-approved seed mix design would be applied to ecosites already existing at the location, and to ensure protections from erosion due to cattle grazing during interim reclamation (fencing would be determined on a case-by-case basis).

2.2.1.3.3 Final Reclamation

A well pad that no longer has a producing well would undergo final reclamation. Prior to final reclamation, Noble would meet with the BLM to inspect the disturbed area, review the existing reclamation plan, and agree to any changes to the plan.

Prior to re-contouring and seeding, the following would occur:

- All equipment, facilities, and trash would be removed from the location;
- Each borehole would be plugged, capped, and its related surface equipment removed; and
- Dry hole markers would be subsurface, to prevent their use as perching sites by raptors.

2.2.1.3.4 Water Requirements

Water required during abandonment would be minimal and may include water to mix cement for well plugging. Water would not be used for reclamation.

2.2.1.4 Schedule

Noble would begin construction once all permits and approvals are obtained. Up to four well pads (with up to four wells) would be constructed during the first year and the remainder of the well pads would be constructed during the second year and beyond. Depending on the results of well tests, up to four of the wells drilled after the first year could be horizontal wells. Drilling a vertical/directional well would require approximately 50 days and drilling a horizontal well would require approximately 65 days. Well completions are expected to require between 5 and 21 days (3 to 5 days for hydraulic fracturing). Well pad and road construction would require approximately 5 days per well pad; drilling a water well would require between 7 and 10 days; and interim reclamation would require approximately 3 days per well pad. Producing wells are expected to be in operation for approximately 20 years.

2.2.1.5 Site Specific Resource Surveys

Land Survey. Well pad locations have been staked in the field. A survey of the proposed access roads and well pad locations would be completed by a registered professional land surveyor, and construction plats would be submitted with APDs prior to construction. A preliminary center stake survey with access roads has been completed by a professional land surveyor for well pads on federal lands and on private lands with federal minerals.

Cultural Survey. A cultural resource inventory of the proposed well pads and their access routes was conducted by Cultural Resource Analysts, Inc. (CRA) in 2012 in accordance with applicable state and federal requirements (Hoffert et al., 2012a). The inventory of the proposed well pads and access roads encompassed 2,596 acres of land including BLM-administered land and private lands where permission was obtained. Thirty-five potential well pad locations were identified from 40 original areas that were surveyed for cultural resources. A standard 20 acres was pre-planned for survey at each potential location with 7 acres intended for initial development. The standard survey area was revised or relocated when adjustments to potential pad locations were made to avoid sensitive cultural and biological properties or to lessen the surficial landscape impacts. A total of 61 miles of access roads required cultural resource inventory to provide access to the well pads selected for the proposed exploration. A minimum 200 foot corridor was surveyed for road improvements or for the construction of new roads to access the exploration pads.

Biological Surveys. Biological surveys were used to establish current conditions and utilization of the area by wildlife. Information gained from the surveys was utilized to adjust the Proposed Action; thus, avoiding and minimizing effects to wildlife. Surveys conducted are listed below:

Hayden-Wing Associates, LLC (HWA) completed BLM-approved block surveys for wildlife and vegetation throughout the entire project area from March 1 to April 15, 2012 (HWA, 2012). The

Wildlife Monitoring Report for Exploration Activity in the Mary's River Project Area was submitted to the BLM for review and comment on November 1, 2012 (HWA, 2012).

Greater sage-grouse winter concentration surveys were conducted during February 2013 (HWA, 2013a). Greater sage-grouse lek attendance surveys were also conducted in 2013 (HWA, 2013b).

JBR Environmental Consultants, Inc. (JBR) collected baseline data for bat species within the project area in August 2013 (JBR, 2013a) for the purpose of incorporation into Noble's Bird and Bat Conservation Strategy (BBCS). The survey area for the baseline acoustic bat survey included approximately 39,444 acres of BLM-administered and private lands in the Marys River project area.

Noise Surveys. Noise surveys were utilized to establish current conditions and develop models to predict how noise travels across the project area. The results of the noise survey are utilized in the cultural and special status species sections. HWA (2013c) conducted background sound level measurements for 7 days between April and mid-May, 2013 at each of three greater sage-grouse leks in the project area to collect a full spectrum of natural and human-caused noise.

J.C. Brennan & Associates, Inc. (Brennan) conducted noise measurements in the Lamoille Valley in September 2013 for the drilling rig to be used in the Marys River project area (Brennan, 2013a). The noise measurements were used to develop noise contours indicating potential noise levels at each proposed well pad and extension of the noise contour at greater sage-grouse leks in the Marys River project area (Brennan, 2013b). An additional analysis was conducted to determine the effects of snow on sound propagation.

Visual and Auditory. Western Cultural Resource Management, Inc. (WCRM) completed a visual and auditory assessment of the California National Historic Trail (CNHT) and the Central and Southern Pacific Railroad (CSPRR) within the project area to identify potential adverse visual and auditory impacts of the project to the CNHT and potential visual impacts to the CSPRR and to make recommendations regarding mitigation of adverse effects or adverse impacts (Morgan et al., 2013).

2.2.1.6 Project Design Features (Applicant-Committed Measures to Protect Resources)

The following design features are included in Noble's MSUPO. They are specifically intended to reduce potential damage to existing infrastructure, the natural environment, and historical sites.

Cultural

- If unknown cultural resources are found during operations, Noble would implement an Unanticipated Discovery Plan for Cultural Resources, which includes immediate stoppage of all work within thirty (30) meters of the discovery as directed by the BLM and immediate notification of the BLM AO.
- Prior to commencement of construction, Noble would inform all employees and contractors through job site safety orientations about compliance requirements associated with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, the Paleontological Resources Preservation Act, and the National Historic Preservation Act.
- Noble would suspend all operations that further disturb such materials and immediately contact the BLM AO. Construction would not resume until authorization to proceed is issued by the BLM AO.

. Fire Management

- Noble has prepared and would implement Fire Prevention Plan Measures (Appendix D).

Hydrology

- Project disturbance would avoid streams, creeks, springs, and wetland areas by 400 feet.
- Fueling would not occur within 400 feet of any riparian areas or standing or flowing surface water including streams, ponds, springs, seeps, and stock reservoirs.
- Noble would prepare and implement a Spill Prevention Plan in accordance with state regulations.
- Noble prepared and would implement a Stormwater Pollution Prevention Plan in accordance with state regulations.
- Noble would clean up diesel, hydraulic fuel, or other spills, including contaminated soils. All spill-related material would be hauled to an approved disposal site.
- Noble would comply with BLM's proposed rule to regulate hydraulic fracturing on public and Indian land (BLM, 2012a). The proposed rule provides disclosure to the public of chemicals used in hydraulic fracturing on public and Indian land, strengthens regulations related to well-bore integrity, and addresses issues related to flowback water. The rule has been proposed to provide useful information to the public and to assure that hydraulic fracturing is conducted in a way that adequately protects the environment.
- Noble would participate in FracFocus, which is a national hydraulic fracturing chemical registry managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission; two organizations concerned with conservation and environmental protection. The primary purpose of the registry is to provide information concerning hydraulic fracturing and groundwater protection (FracFocus, 2014).
- Noble has entered into an MOU with the State of Nevada through the NDOM, the NDEP, and the Board of Regents of the Nevada System of Higher Education on behalf of the Desert Research Institute (DRI) to establish the Aquifer Quality Assessment Program (Aqua Program) to gather and share data and information on groundwater and geological conditions associated with the fate and transport of chemicals used for hydraulic fracturing. The MOU is included as Appendix F.

Invasive, Non-Native Species

- Noble would follow measures included in the Marys River Integrated Weed Management Plan (Appendix B).

Public Health and Safety

- Project-related vehicle traffic would be limited to designated roads included in the Proposed Action.
- Project-related vehicles would travel at speeds within set speed limits for main roads and would not exceed 20 mph on local and resource roads.
- Noble would conduct a Job Site Assessment meeting prior to kick off with the entire Project team and have daily safety tailgates each morning.
- All contractors would be required to have a Health and Safety Plan, which would include emergency response protocol, written and implemented specific to project requirements.

Vegetation

- Noble would follow measures included in the Marys River Reclamation Plan (Appendix C).
- Noble would implement a baseline ecosite vegetation and weed survey for each well pad prior to construction to ensure that a proper seed mix design would be applicable to ecosites already existing at the location and to ensure protection from erosion due to cattle grazing during interim reclamation.

Wildlife and Special Status Species

- Noble has prepared and would follow BMPs to protect greater sage-grouse and greater sage-grouse habitat (Attachment A to Appendix E).
- Noble would inform employees and contractors that harassing (including feeding, approaching, pursuing, or otherwise intentionally disturbing) or shooting of wildlife would not be permitted; dogs may not be brought to the project area; no firearms would be allowed on-site; and there would be no littering, including trash that was not secured properly and has been dispersed by wind.
- Noble would conduct pre-disturbance surveys for pygmy rabbits before each well pad is constructed.
- Noble has committed to voluntarily monitor active leks as described in the Sage Grouse Management Plan (see Appendix E).
- Noble has prepared a BBCS that includes the following measures in order to protect avian and bat species:
    - If vegetation clearing is planned during the core nesting period (March 15 through July 31), surveys shall be conducted 7 to 10 days prior to clearing. If nests are found within areas where vegetation would be removed, surface disturbances would not occur until after July 31. If no nests are found, clearing would be possible with no timing limitation if conducted within 14 days of the survey.
    - All open pipes shall be capped or filled to prevent birds from becoming trapped.
    - All exhaust stacks shall be screened and outfitted with anti-perching devices to prevent bird or bat entry and to discourage perching, roosting, and nesting. Caps and screens shall be checked regularly to ensure they are effective.
    - Garbage shall be removed at frequent intervals to avoid attracting scavengers and avian predators to the pad vicinities.
    - No vehicles shall be parked off pad or road disturbance to avoid contamination, crushing nests, or ignition of fires.
    - The maximum speed limit for all project vehicles in the project area will be no more than 20 mph.
    - Employees and contractors must stay on pad areas for the duration of the shift and not wander into surrounding areas.
    - All reasonable, prudent, and effective measures such as using suitable mufflers on all internal combustion engines and implementation of only authorized access shall be used to reduce potential impacts to migratory birds and bats.

2.2.2 NO ACTION ALTERNATIVE

In accordance with NEPA and CEQ regulations that require that a No Action Alternative be presented in all environmental analyses in order to serve as a “base line” or “benchmark” from which to compare all proposed “action” alternatives, a No Action Alternative is analyzed in this EA.

Under the No Action Alternative, the Wells Field Manager would not approve Noble’s MSUPO and the Proposed Action would not be implemented.

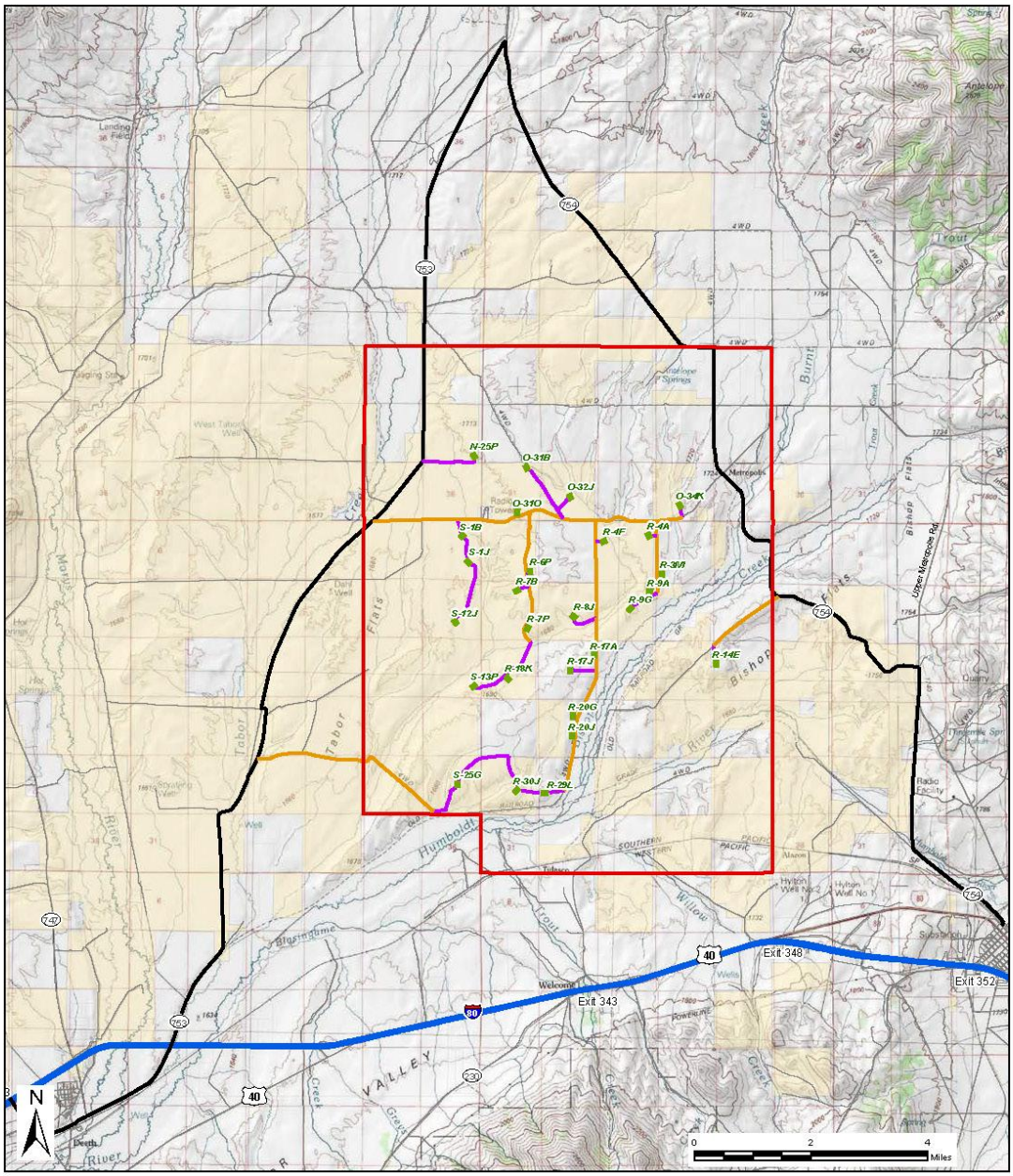
2.2.3 VISUAL ALTERNATIVE

This alternative was developed to reduce indirect visual impacts that the Proposed Action may have on the eligible sections of the CNHT as identified in the visual and auditory assessment (Morgan et al., 2013).

Under the Visual Alternative, six well pads identified in the Proposed Action would be excluded from consideration as one of the 33 potential locations. Well pads R-27M, R-27F, R-27I, R-21K, R-21A, and R-10N, located in the southwest portion of the project area, would not be included in this alternative. The 27 potential well pads in the Visual Alternative are listed in Table 2.2-13 and shown on Map 2.2-2. The federal leases that could be potentially affected under the Visual Alternative are the same as those that could be affected under the Proposed Action because the six wells pad eliminated under the Visual Alternative are on private surface and private minerals. Table 2.2-2 (Section 2.2.1.1) lists the potentially affected federal leases, the well pads that would apply to the lease, and summarizes the lease stipulations.

Table 2.2-13
Potential Well Pad Locations with Surface and Mineral Ownership under the Visual Alternative

Well Pad Name	T	R	Sec	Surface Qtr/Qtr	Surface Ownership	Mineral Ownership
N-25P	39N	60E	25	SESE	Federal	Private
O-31B	39N	61E	31	NWNE	Federal	Private
O-32J	39N	61E	32	NWSE	Federal	Federal
O-31O	39N	61E	31	SWSE	Federal	Private
S-1B	38N	60E	1	SWNE	Federal	Private
S-1J	38N	60E	1	NESE	Federal	Private
S-12J	38N	60E	12	NWSE	Federal	Federal
R-6P	38N	61E	6	SESE	Federal	Federal
R-7P	38N	61E	7	SESE	Federal	Federal
S-13P	38N	60E	13	SESE	Federal	Private
R-18K	38N	61E	18	NESW	Federal	Federal
R-4F	38N	61E	4	SWNW	Federal	Federal
R-4A	38N	61E	4	NENE	Federal	Federal
O-34K	39N	61E	34	SESW	Federal	Federal
R-9A	38N	61E	9	NENE	Federal	Private
R-9G	38N	61E	9	SWNE	Federal	Private
R-8J	38N	61E	8	NWSE	Federal	Federal
S-25G	38N	60E	25	NWSE	Federal	Private
R-30J	38N	61E	30	NWSE	Federal	Federal
R-7B	38N	61E	7	NWNE	Federal	Federal
R-29L	38N	61E	29	NWSW	Private	Private
R-20J	38N	61E	20	NWSE	Private	Private
R-20G	38N	61E	20	SWNE	Private	Private
R-17J	38N	61E	17	NWSE	Private	Private
R-17A	38N	61E	17	NENE	Private	Private
R-14E	38N	61E	14	SWNW	Private	Private
R-3M	38N	61E	3	SWSW	Private	Private



Legend

Project Boundary

Surface Ownership
- Federal
- Private

General Access
- Existing - No Improvement
- Existing - Needs Improvement
- New - Proposed
- Interstate
- Existing Secondary Roads

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

MAP 2.2-2

Visual Alternative

Marys River
Oil and Gas Exploration Project

Elko County, NV — March 2014

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With the exception of the number of potential well pads considered for exploration and the extent of associated surface disturbance for roads including turnouts (two are removed), all components of the Visual Alternative would be the same as those described for the Proposed Action. During the Construction/Drilling Phase, Noble would construct up to 20 well pads; drill and complete a maximum of 20 exploration wells over two or more years; and potentially drill on-site water supply wells and/or construct a disposal/injection well. Any water supply and/or disposal/injection wells would be drilled on one of the 20 well pads. Once wells are drilled and completed, economically viable wells would enter the Production/Operations Phase and operate for up to 20 years.

All surface disturbance associated with the Visual Alternative would occur during the Construction/Drilling Phase. Table 2.2-14 lists the maximum potential short-term and long-term disturbances for each project component. Short-term disturbance includes all disturbances for well pads and roads that would occur during the Construction/Drilling Phase. Following interim reclamation of temporary disturbances associated with road and well pad construction, long-term disturbance would remain throughout the Production/Operations Phase. The estimated disturbances shown in Table 2.2-14 include surface disturbances on BLM-administered lands and on private lands.

Table 2.2-14
Identified Potential Short-Term and Long-Term Surface Disturbance as a Result of Oil and Gas Exploration under the Visual Alternative

Component	Potential Length or Number of Sites	Potential Short-Term Surface Disturbance (acres)[7]			Potential Long-Term Surface Disturbance (acres)[7]		
		Federal	Private	Total	Federal	Private	Total
Well Pads[1,2]	27	140.2	49.1	189.3	100.0	35.0	135.0
New Resource Roads[3]	5.7 miles	19.2	2.7	21.9	13.2	1.9	15.1
Upgraded Resource Road[3]	1.4 miles	0.0	6.0	6.0	0.0	4.3	4.3
Turnouts[4]	5	0.0	0.0	0.0	0.7	0.0	0.7
New Local Roads[5]	4.6 miles	19.1	1.2	20.3	13.7	0.9	14.6
Upgrade Local Roads[5,6]	16.9 miles	49.3	22.5	71.8	35.1	16.2	51.3
Total		**227.8**	**81.5**	**309.3**	**162.7**	**58.3**	**221.0**

[1] Noble identified 27 potential well pad locations and all 27 well pads are included with these estimates; however, no more than 20 of the 27 potential locations would be constructed. Eleven of the proposed well pads are identified on federal surface with federal minerals, nine are identified on federal surface with private minerals, and 7 are identified on private surface with private minerals.

[2] Short-term well pad disturbance before interim reclamation is estimated at 7 acres for the first six well pads and 6 acres for the remaining 14 well pads, but 7 acres is used here for all well pads. Long-term disturbance after interim reclamation could be up to 5 acres per well pad, and would average 3.5 acres.

[3] Based on 16 foot travel surface with 5 feet for ditches (2.5 feet on either side) for resource roads' long-term disturbance. Ten feet of temporary use area (short-term disturbance) would be required for construction.

[4] Turnouts would be 10 feet in width by 600 feet in length. Short-term disturbance is not noted for turnouts because it would be within the temporary disturbance for roads; however, it is noted as long-term disturbance.

[5] Upgraded existing local roads and new local roads would have 24 foot travel surface with 5 feet for ditches (2.5 feet on either side) representing long-term disturbance. An additional 10 feet of temporary use area (short-term disturbance) would be required for construction. Disturbance would include blading and removal of vegetation.

[6] Existing roads that require upgrading are 12.7 feet wide. Existing disturbance (approximately 43.3 acres) is not subtracted from the proposed disturbance footprint – all new disturbance is assumed.

[7] Total acres are taken from GIS disturbance footprint model and are not calculated by multiplying width times length divided by 43,560.

0Under the Visual Alternative, up to 18.3 miles of existing local and resource roads could require upgrading and up to 10.3 miles of new local and resource roads could be constructed. Other project components, including well pad construction, drilling and completion; water requirements and water supply; workforce and traffic; production/operations; abandonment and reclamation; project schedule; site specific resource surveys; and Project Design Features (applicant-committed measures to protect resources) that apply to the Visual Alternative are unchanged from those described in Section 2.2.1 for the Proposed Action.

The actual amount of disturbance (for up to 20 well pads and associated access roads) under the Visual Alternative would be the same as that for the Proposed Action; however, disturbance would not occur for well pads R-27M, R-27F, R-27I, R-21K, R-21A, and R-10N.

Table 2.2-15 summarizes the differences between potential identified short-term and long-term surface disturbance under the Proposed Action and the Visual Alternative (for 33 well pads and 27 well pads, respectively).

Table 2.2-15
Comparison of Potential Short-Term and Long-Term
Surface Disturbance under the Proposed Action and Visual Alternative

Alternative and Project Component	Potential Length or Number of Sites	Potential Short-Term Surface Disturbance (acres)			Potential Long-Term Surface Disturbance (acres)		
		Federal	Private	Total	Federal	Private	Total
Well Pads							
Proposed Action	33	140.2	91.1	231.3	100.0	65.0	165.0
Visual Alternative	27	140.2	49.1	189.3	100.0	35.0	135.0
Difference[1]	-6	0.0	-42.0	-42.0	0.0	-30.0	-30.0
New Roads[2]							
Proposed Action	12.6 miles	45.1	8.1	53.2	32.0	5.6	37.6
Visual Alternative	10.3 miles	38.3	3.9	42.2	26.9	2.8	29.7
Difference[1]	-2.3 miles	-6.8	-4.2	-11.0	-5.1	-2.8	-7.9
Upgraded Roads[2]							
Proposed Action	20.5 miles	62.2	35.1	97.3	46.3	26.2	72.5
Visual Alternative	18.3 miles	49.3	28.5	77.8	35.1	20.5	55.6
Difference[1]	-2.2 miles	-12.9	-6.6	-19.5	-11.2	-5.7	-16.9
Turnouts							
Proposed Action	7	0.0	0.0	0.0	0.7	0.3	1.0
Visual Alternative	5	0.0	0.0	0.0	0.7	0.0	0.7
Difference[1]	-2	-0.0	-0.0	-0.0	-0.0	-0.3	-0.3
Total							
Proposed Action		247.5	134.3	381.8	179.0	97.1	276.1
Visual Alternative		227.8	81.5	309.3	162.7	58.3	221.0
Difference[1]		-19.7	-52.8	-72.5	-16.3	-38.8	-55.1

[1] A negative number indicates fewer miles, turnouts and less surface disturbance identified under the Visual Alternative as compared to the Proposed Action.
[2] Includes resource and local roads.

2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

If an alternative is considered during the environmental analysis process but the agency decides not to analyze the alternative in detail, the agency must identify those alternatives and briefly explain why they were eliminated from detailed analysis (40 CFR 1502.14).

Concerns raised during scoping have been addressed through mitigation measures for each resource or were included in the Project Design Features; therefore, no alternatives were considered other than the Proposed Action, the No Action Alternative, and the Visual Alternative.